THESIS

HYDROGEOLOGIC CHARACTERIZATION OF THE FOUNTAIN FORMATION: PROSPECTIVE AQUIFER STORAGE AND RECOVERY TARGETS IN FRONT RANGE COLORADO

Submitted by

Daniel Collazo

Department of Geosciences

In partial fulfillment of the requirements

For the Degree of Master of Science

Colorado State University

Fort Collins, Colorado

Summer 2018

Master's Committee:

Advisor: Sally Sutton

Thomas Sale
Michael Ronayne

ABSTRACT

HYDROGEOLOGIC CHARACTERIZATION OF THE FOUNTAIN FORMATION: PROSPECTIVE AQUIFER STORAGE AND RECOVERY TARGETS IN FRONT RANGE COLORADO

Aquifer storage and recovery (ASR) is a method of water storage that typically involves using the same well to inject water into and recover water from an aquifer. Benefits of ASR include lower capital costs than surface storage methods, negligible losses due to evaporation or potential contamination, and a much smaller land use footprint. This method of storing water is of interest for northern Colorado because of the location of existing water supply infrastructure and bedrock aquifers along the Front Range and the need for additional water storage. A potential storage zone for ASR in northern Colorado is the Fountain Formation. The Fountain is a Pennsylvanian-Permian arkosic conglomeratic sandstone with interbedded siltstone and shale that outcrops in a narrow, north-south trending belt from southern Wyoming to central Colorado. Within the outcrop belt, the Fountain is about 500 to 4500 feet thick and dips steeply to the east. The Fountain Formation was formed from sediments shed off the Ancestral Rocky Mountains, an uplift associated with the Ouachita-Marathon Orogeny, and deposited mainly in alluvial fans and braided streams. The composition of the formation is heterogeneous with permeable facies such as coarse sandstones adjacent to impermeable facies such as mudstones.

This study characterizes the hydrogeology of the Fountain Formation to assess the feasibility of the Fountain as a storage zone for ASR, and in particular in northern Colorado. Data from 1262 wells in the Fountain were collected from the Colorado Division of Water Resources AquaMap database to characterize the hydraulic properties of the formation. The data were used to calculate specific capacity for each well and plotted on maps to help identify areas of interest for ASR. Within the formation there are wells with high yields and specific capacities which suggests that the Fountain can host high yield wells suitable for ASR. Water level elevation maps were also made for selected quadrangles and provide an approximation of the water level surface within the aquifer as well as the direction of water flow. Well-cemented outcrop samples were collected and tested for permeability using an air permeameter. The samples all have relatively low permeabilities, but it is likely that the less cemented lithologies have much higher permeabilities. The heterogenous lithology of the formation is likely able to store large volumes of water while preventing the water from migrating away from an ASR well. The results of this study suggest that the Fountain Formation is a feasible target for ASR implementation.

ACKNOWLEDGEMENTS

I would like to thank my advisor, Sally Sutton, for all her guidance regarding my graduate school research, general advice, and all the help editing my thesis. I also want to thank my committee members Tom Sale and Mike Ronayne for their support and direction in this project. Thanks goes to the Colorado Water Institute, the Joby Adams Scholarship, and Colorado State University for funding this work.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTION

1.1 Background

Aquifer storage and recovery (ASR) is a method of water storage that typically involves using a well to inject water into an aquifer when there is excess water supply. When the stored water is needed at a later time it is recovered using the same well (Pyne, 2005). Benefits of ASR include lower capital costs and a much smaller land use footprint than surface storage methods. In addition, storing water using ASR has negligible losses due to evaporation, seepage, or potential contamination (Pyne, 2005). This method of storing water is of interest for northern Colorado because of the location of existing water supply infrastructure and bedrock aquifers along the Front Range. These bedrock aquifers have the potential to store significant amounts of water due to their large areal extent and hundreds of feet of freeboard in some cases (Topper et al., 2004). Additional water storage is of increasing importance as the population of the Front Range increases and the risk associated with drought grows larger.

This study focuses on the Fountain Formation as a potential storage zone for ASR in northern Colorado. The Fountain is a Pennsylvanian-Permian arkosic conglomeratic sandstone with interbedded siltstone and shale that outcrops along the Front Range of northern Colorado and southern Wyoming. The Fountain is about 800 ft (244 m) thick in the vicinity of Fort Collins, Colorado and steeply dips to the east, reaching a depth of approximately 3000 feet beneath the surface 1 mile east of the outcrop (Braddock et al., 1988; Braddock et al., 1989). The Fountain Formation has

been studied for over a century but little is published concerning its hydraulic properties. Although the Fountain has many wells that are used for household water supply, it has not been extensively evaluated as a water resource on a regional scale or for the possible application of ASR. This study characterizes the geology and hydrology of the Fountain Formation to assess the feasibility of the Fountain as a storage zone for ASR in northern Colorado.

1.2 Objectives

The objectives of this study are to:

1. Create an inventory of hydraulic data from water wells completed in the Fountain Formation
2. Characterize the hydraulic properties of the Fountain using collected well data
3. Describe the geology of the Fountain Formation (areal extent, thickness, depth, stratigraphy, lithology, major structures) using literature and some additional field observations
4. Assess the feasibility of the Fountain Formation as a target for ASR in northern Colorado
5. Assess how the Fountain Formation changes spatially with respect to aquifer properties and locate areas of interest for application of ASR

1.3 Geologic Setting

The Fountain Formation is located along the eastern flank of the Front Range in Colorado and southern Wyoming. From southern Wyoming to Perry Park, Colorado (approximately 40 miles south of Denver) the Fountain Formation lies unconformably on Precambrian basement (Fig. 1). South of Perry Park the Fountain lies unconformably on the Madison Age (Mississippian) Leadville Limestone (Wahlstrom, 1948). The Fountain underlies the Ingleside Formation from southern Wyoming to Lyons, Colorado and underlies the Lyons Formation from Lyons to its southernmost extent (Butters, 1913; Frederickson et al., 1956). The formation outcrops along the western edge of the Denver-Julesburg Basin from Iron Mountain, Wyoming to Canon City, Colorado in a narrow belt approximately one mile wide (Howard, 1966). The Fountain dips steeply to the east and continues eastward into the basin eventually grading into deep marine facies (Robson and Banta, 1987). Towards the north the Fountain thins out and interfingers with the Casper Formation while towards the south it pinches out (Howard, 1966). The thickness of the Fountain ranges from a maximum of 4500 ft near Colorado Springs to a thickness of 500 ft in southern Wyoming (Hubert, 1960; Ver Ploeg and Boyd, 2007). The Fountain has a north-south strike from southern Wyoming to Colorado Springs and changes to an east-west strike from Colorado Springs to Canon City.

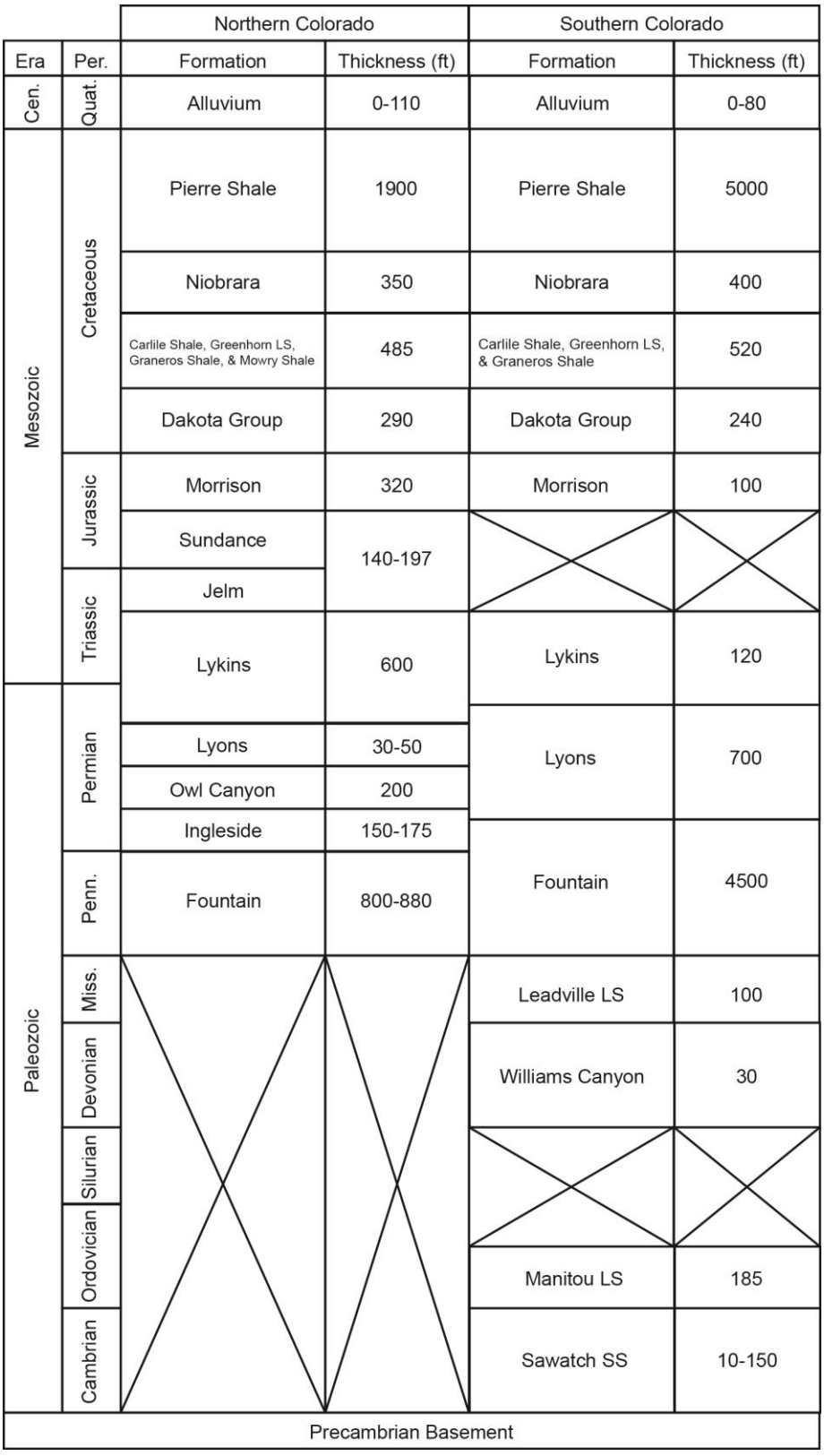


Figure 1. Stratigraphic column of Northern Colorado near Fort Collins and Southern Colorado near Manitou Springs (data from Braddock et al. 1989 and Keller et al. 2003).

The Fountain Formation was formed from sediment shed off the Ancestral Rocky Mountains (ARM) and deposited in alluvial fans and braided streams during the Pennsylvanian and Early Permian (Jennings, 1980; Maples and Suttner, 1990; Soreghan et al., 2012). The ARM uplift also resulted in the erosion of Mississippian and older sedimentary formations and exposure of the Precambrian basement. The formation was deposited on the eastern side of the Ancestral Front Range and the northern side of the Ute Pass Uplift (Sweet and Soreghan, 2009). These uplifts were part of the Ancestral Rocky Mountains and were located just west of the modern Front Range in Colorado and southern Wyoming (Fig. 2).

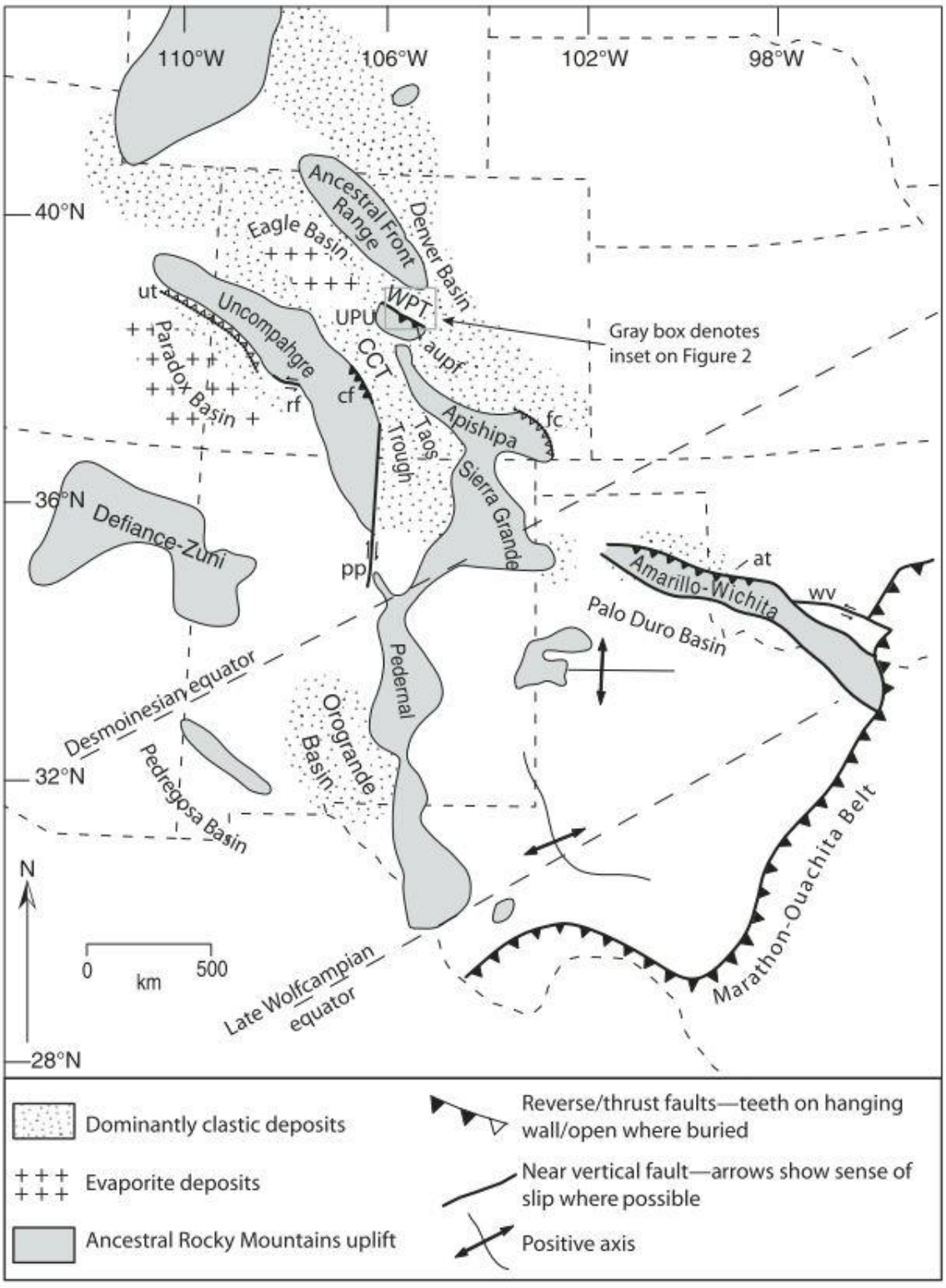


Figure 2. Map of ARM uplifts and associated basins during the late Paleozoic. UPU=Ute Pass Uplift (from Sweet and Soreghan, 2009).

The ARM were a series of intracratonic block uplifts that have been associated with the Ouachita-Marathon Orogeny (Kluth and Coney, 1981; Dickinson and Lawton, 2003). The Ouachita-Marathon Orogeny began in latest Mississippian to Pennsylvanian time and resulted from the collision between South America-Africa and North America. Dickinson and Lawton (2003) suggest that the formation of the ARM was induced by activation of preexisting weaknesses in response to stresses associated with the closure of the Ouachita-Marathon suture. The ARM uplift continued into and ceased during the Permian while younger sediments buried the Fountain Formation (Kluth and Coney, 1981). The end of the ARM uplift is associated with load-induced subsidence that resulted from the changing stresses that came with the last phase of the Ouachita-Marathon orogeny. The ARM was subsequently eroded during the Triassic and Jurassic (Soreghan et al., 2012). During the Late Cretaceous the Laramide Orogeny uplifted the Precambrian basement and exposed the Fountain and overlying formations (Hogan and Sutton, 2014).

CHAPTER 2. PREVIOUS WORK ON THE FOUNTAIN FORMATION

2.1 The Fountain Formation

The Fountain Formation was first named by Cross (1894) at exposures along Fountain Creek near Manitou Springs, Colorado. Later authors redefined the contacts and constrained the age of the formation. Finlay (1907) revised the contacts of the Fountain to overlie the newly described Gleneyrie Formation and to underlie the Lyons Formation near Manitou Springs. Finlay also assigned the age of the Fountain Formation to the Pennsylvanian based on fossil brachiopods found within the Fountain and fossil plants of Pennsylvanian age found in the Gleneyrie. The Gleneyrie Formation was later reclassified as the Glen Eyrie Member of the Fountain Formation with the lower contact of the Fountain being Mississippian limestone south of Perry Park, Colorado (Wahlstrom, 1948). Butters (1913) revised the upper and lower contacts of the Fountain in northern Colorado so that it underlies the Ingleside Formation and unconformably overlies the Precambrian from Lyons, Colorado into Wyoming. Others (Butters, 1913; Knight, 1929) revised the extent of the Fountain and traced it into the Laramie Basin of Wyoming. Frederickson et al. (1956) suggested that the Fountain Formation extends into the Early Permian. They found that the upper part of the Fountain interfingers with the Permian Lyons Formation near Canon City, Colorado.

The depositional environment of the Fountain Formation was primarily alluvial fans and braided streams that carried sediment shed from the Ancestral Rocky

Mountains (Tieje, 1923; Knight, 1929; Howard, 1966; El-Banna, 1993; Sweet and Soreghan, 2008). Howard (1966) measured primary directional structures in the Fountain to determine the location of the Ancestral Rocky Mountains and eleven alluvial fans that were a source of the Fountain sediments. The formation also includes fan-delta complexes such as the Manitou embayment (Suttner et al., 1984). The lower third of the Fountain was primarily deposited in a nearshore shelf setting (Maples and Suttner, 1990) and as the formation continues eastward into the Denver Basin it grades into a deeper marine depositional environment (Robson and Banta, 1987).

The Fountain Formation is composed of many stacked sequences of fining upward cycles within the upper two-thirds of the formation. These cycles typically include several distinct facies which have been characterized by several authors (e.g. Suttner et al., 1984; El-Banna, 1993; Hogan and Sutton, 2014) with differing definitions but the same overall fining upward sequence. El-Banna (1993) studied paleosols and diagenesis of the Fountain and defined the facies within the formation as conglomeratic facies, trough crossbedded sandstones, horizontally bedded and planar crossbedded sandstones, horizontally laminated fine sandstones and shales. The Fountain also contains some rare limestone beds (Hubert, 1960; Hogan and Sutton, 2014). The lower third of the formation includes nearshore marine facies. Maples and Suttner (1990) described multiple marine-nonmarine cycles within the lower third of the Fountain. Each cycle represents a progradational sequence in which they described the facies typically found within: transgressive-lag conglomerate, offshore mudstone, hummocky

crossbedded sandstone, planar crossbedded granular sandstone, low angle crossbedded coarse grained sandstone, and lenticular conglomeratic sandstone.

Throughout the Fountain Formation there are whitened strata that are very distinguishable from the typically red and purple colors of the formation. The red color of the Fountain may be the result of detrital hematite that stains the grains and clay matrix (Wahlstrom, 1948; Hubert, 1960). Walker (1967) suggests that the red color of the Fountain is instead due to precipitation of hematite cement from alteration of iron bearing silicates shortly after burial in an arid climate. Hogan and Sutton (2014) used observation of the partially whitened strata in the Fountain to determine that fluid flow in the formation generally occurs in coarser grained lithology and in strata adjacent to paleosol mudstones. These mudstones appear to act as low permeability barriers to fluid flow within the formation and separate the more permeable strata. The whitened rock in the Fountain was most likely the result of the passage of reducing fluids which were determined to include hydrocarbons.

Cullers and Stone (1991) determined the chemical and mineralogic composition of sediments from arkosic sandstones within the Fountain Formation near Beulah, Colorado. They report that the sediments were derived from an uplifted continental block and plot within active or passive continental margin fields in tectonic discrimination diagrams. Van de Kamp and Leake (1994) compared the mineralogy and bulk chemistry of arkosic sandstones of the Fountain Formation to the Pennsylvanian-Permian Cutler Formation and Pennsylvanian Minturn Formation. They found that the

Fountain had undergone epithermal potassic alteration near Eldorado Springs, Colorado. Condie et al. (1995) studied rare earth elements (REEs) of a paleoweathering profile on the Boulder Granodiorite and found that the REE distributions and element ratios in the directly overlying Fountain differ from the weathering profile. They attribute this difference to multiple factors including the contribution of other sources of Fountain sediments and mineral sorting during deposition.

There have been numerous studies on the paleoclimate of the Fountain Formation. Finlay (1916), Tieje (1923), and Walker (1967) suggest that the Fountain was deposited under semi-arid or arid and warm conditions. Walker (1967) suggests that the Ancestral Front Range must have been an arid environment because of evidence of regional aridity throughout the Western U.S. such as extensive evaporite deposits of Pennsylvanian and Permian age. Other authors (Mclaughlin, 1947; Wahlstrom, 1948; Mack and Suttner, 1977) have concluded that the Fountain was instead deposited in a humid and warm climate. Mack and Suttner (1977) compared Holocene sands to the Fountain Formation and concluded that the environment of deposition during the Pennsylvanian was significantly more humid than the Front Range during the Holocene. However, Suttner and Dutta (1986) compared the compositional maturity and fossils of the lower Fountain and upper Fountain and concluded that the climate changed from warm and humid to warm and arid. There have also been studies on possible cold conditions and equatorial glaciation during the time the Fountain Formation was being deposited (Sweet and Soreghan, 2008; Sweet and Soreghan, 2010). Sweet and Soreghan (2008) studied polygonal fractures present in the Fountain

Formation and interpreted them to be the result of thermal contraction during at least two episodes of cold conditions for the Fountain. Sweet and Soreghan (2010) used scanning electron microscopy (SEM) to analyze the microtextures of quartz grains within the Fountain. They conclude that their observations indicate the grains underwent glacial transport and that upland glaciers were present in the source area of Fountain Formation sediments.

The Fountain Formation is usually assigned to the Pennsylvanian and Early Permian based on paleontological studies carried out within the Fountain and adjacent units. Jennings (1980) described fossil plants within the Fountain near Canon City that are Pennsylvanian in age. Suttner et al. (1984) described fossil marine invertebrates and plants of Pennsylvanian age within the lower Fountain. Maples and Suttner (1990) described two assemblages of marine trace fossils within the lower third of the Fountain Formation which indicate the formation is Pennsylvanian. The fossils also indicate that the marine facies in the lower part of the Fountain were deposited in a nearshore shelf setting. Some authors (Carsrud et al., 2013; Sweet et al., 2015) propose that the Fountain Formation is entirely Pennsylvanian in age. This is based on their observation of the Lower Permian eolian unit above the Fountain at Manitou Springs which is typically assigned to the Lyons Formation and puts the Fountain into the Early Permian. They conclude that it is better classified as Ingleside and not Lyons. Assigning the unit as Ingleside puts the Fountain entirely in the Pennsylvanian and has implications for the timing of the end of Ancestral Rocky Mountain uplift.

2.2 Hydrologic Studies on the Fountain Formation

Most studies of the Fountain Formation focus on sedimentology, stratigraphy, paleoclimate, and geochemistry. There are very few publications on Fountain hydrogeology or hydrology, or that evaluate the formation as an aquifer or water resource. This lack of hydrologic studies for the Fountain may reflect that the formation is only useful as an aquifer near the western edge of the Front Range, where it has primarily been used as a water supply for rural household wells and rarely used for municipal wells. This is because the Fountain is only shallow enough for water wells near its outcropping along the western edge of the Denver-Julesburg Basin. The formation dips steeply to the east and rapidly plunges to depths that are not feasible for water wells. For example, the Fountain outcrops just west of Fort Collins, CO at around 5000 ft above sea level and reaches 3000 ft below sea level around the eastern edge of the city (Robson and Banta, 1987).

There have been multiple studies on the Fountain Formation as an aquifer in the Laramie Basin of Wyoming (Littleton, 1950; Huntoon and Lundy, 1979; Davis, 1984). The Fountain is considered a part of the Casper aquifer in Wyoming, the other part being the Casper Formation. Davis (1984) conducted a hydrodynamic study of the Casper Aquifer using water resistivity, geothermal, and potentiometric head data to define groundwater circulation patterns within the basin.

Some of the publications that study the Fountain Formation as an aquifer in Colorado (McWhorter, 1984; Barkmann et al., 2015) consider the Fountain to be part of

the Lyons-Fountain Aquifer due to the limited extent of the Lyons Formation in some locations and its small stratigraphic thickness. Additionally, the Lyons is hydraulically connected to the Fountain, while the shales and siltstones of the younger Lykins Formation act as a confining layer for the Lyons-Fountain Aquifer (Leonard, 1984). The Fountain Formation is recharged at the narrow band of outcrop along the Front Range and this groundwater flows in an eastward to northeastward direction (Robson and Banta, 1987). This water flows into the stratigraphically equivalent fine-grained marine rocks to the east and to the underlying Mississippian and Ordovician rocks, where they are present. Primary porosity and permeability in the Fountain is formed by intergranular pore space and secondary permeability is from fractures (Barkmann et al., 2015). The Fountain is a very heterogenous formation with bodies of fluvial sandstones and conglomerates separated from each other by shales and siltstones. According to Barkmann et al. (2015), hydraulic interconnection between the more permeable lithologies can be limited except for where faults and fractures are present and connect these bodies.

McWhorter (1984), reported hydraulic properties of bedrock aquifers in the Denver Basin including the Lyons-Fountain Aquifer. These values are a hydraulic conductivity of 0.7-1.3 ft/d, transmissivity of 70-130 ft^2/d, a storage coefficient of 0.0001, and a specific yield of 0.02-0.05. According to Robson and Banta (1987) the Fountain varies in porosity from 3 to 21 percent within sandstone and conglomerate beds, hydraulic conductivity ranges from 0.025 to 4 ft/d, and typical well yields are 1 to 15 gpm. Hogan and Sutton (2014) report porosity for Fountain sandstones between

Laporte, CO and Lyons, CO to range from 3 to 7 percent. Barkmann et al. (2015) reports the utilization of the Lyons-Fountain Aquifer in Douglas County, Colorado including depths, water levels, and production rates of wells completed in the aquifer. They report production rates ranging from 1 to 180 gpm.

CHAPTER 3. PREVIOUS WORK ON AQUIFER STORAGE AND RECOVERY

3.1 Aquifer Storage and Recovery

Aquifer storage and recovery (ASR) is a type of managed aquifer recharge that uses wells to store water in an aquifer when there is excess supply. When the stored water is needed it can be recovered by pumping the same wells (dual-purpose well) (Pyne, 2005). The most common application of ASR is to add seasonal water storage to a municipal water supply. However, Pyne (2005) mentions other possible applications of ASR, such as emergency water storage, restoring water levels in a depleted aquifer, and managing seawater intrusion. These applications of ASR can increase the capacity and resiliency of municipal water supplies that mainly rely on surface water or bedrock aquifers. ASR is typically used in confined aquifers but can be used in unconfined aquifers. There are many advantages of using ASR over other forms of water storage or artificial recharge. For example, ASR is cost effective because having a dual-purpose well reduces construction costs and reduces maintenance costs by preventing the clogging of well screens typical of single-purpose injection wells (Pyne, 2005; Antoniou et al., 2012). ASR also eliminates losses due to evaporation and has a significantly smaller land area impact than is typical of surface reservoirs. In a feasibility study of ASR in the Murrumbidgee Region of Australia, Khan et al. (2008) estimated that the development of ASR for the mitigation of drought would be less than half the cost of surface water storage and would not have negative environmental consequences or evaporation losses.

Disadvantages of ASR include uncertainty in recovering injected water and water quality uncertainty due to interaction between recharged water and rock or between recharge water and native groundwater (SJRWMD and Pyne, 2004; Pyne, 2005). Additional disadvantages include project complexity, and differences in water law and permitting in different states. These concerns may lead to increased project costs or abandoned projects.

A typical ASR well creates a storage bubble of injected water that extends tens to hundreds of meters away from the well (SJRWMD and Pyne, 2004). This stored water displaces the native groundwater and results in a buffer zone of mixing between the two volumes. The buffer zone is especially advantageous where the native groundwater is brackish. The volume of recoverable water is equal to the total amount of water stored minus the volume of the buffer zone. In Figure 3 the volume of recoverable water is labeled “stored water”. The total amount of water stored is also called the Target Storage Volume (Pyne, 2005).

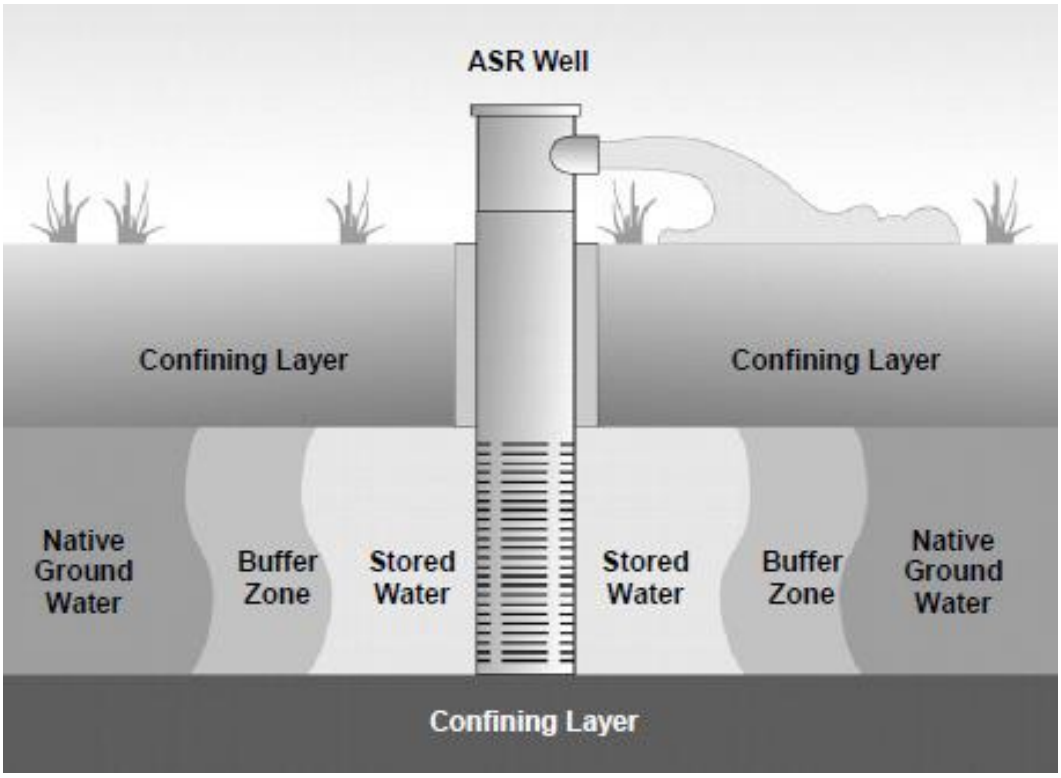


Figure 3. Cross section of a typical ASR well (from SJRWMD and Pyne, 2004).

Artificial recharge was first investigated by the USGS in the 1910s using drainage wells to reclaim wetlands in various sites around the U.S. with successful implementation of this method in the Floridan Aquifer during the 1930s. Wells were successfully used to recharge groundwater in the 1930s. In Orlando, Florida drainage wells were used to recharge storm runoff to the Floridan Aquifer. In New York groundwater pumped for air conditioning was required to be recharged either by well injection or spreading basins (Weeks, 2002). In the 1940s the USGS conducted experiments with ASR in several locations around the U.S. During the same decade municipalities in New Jersey began implementing ASR in their water supply management (Pyne, 2005). Since then ASR has been implemented in many states and

countries and in differing aquifer types. As of 2009 there were 542 ASR wells operating in the US. This reflects the increasing interest in alternative water supplies as the need for water increases in water scarce regions like the western states and in high population centers on the east and west coasts (EPA, 2012).

An important consideration for ASR projects is any possible chemical interaction between injected water and the aquifer rock and native groundwater. For example, a concern for ASR wellfields in Florida is that arsenic and other metals present in the limestone of the Floridan aquifer tend to leach out when the native groundwater is displaced by recharge water. This leads to initial concentrations of arsenic that do not meet drinking water standards. However, the St. Johns River Water Management District and ASR users in Florida have found that the concentrations of metals decrease to within standards after 4 to 8 ASR cycles of the storage volume (SJRWMD and Pyne, 2004). Antoniou et al. (2012) identified the hydrogeochemical processes that took place during multiple ASR cycles in an anoxic sandy aquifer in the Netherlands. They found that injected oxic drinking water increased concentrations of Fe(II), Mn(II), and NH_4, with concentrations of Mn(II) exceeding drinking water standards. The source on Mn(II) was leaching of Mn-siderite in a specific layer of the aquifer (Antoniou et al., 2012). The negative effect of Mn(II) being released into the stored water at this site meant that use of ASR was considered not feasible. In a later study Antoniou et al. (2013) used reactive transport modeling to find a potential solution to the leaching of Mn(II). Their model showed that the release of Mn(II) could be restrained by adding pH buffers to the injected water (Antoniou et al., 2013).

There are many other factors to consider when assessing a site for ASR implementation. According to Pyne (2005), the areal extent, thickness, depth, and hydraulic characteristics of the aquifer are important factors to consider. Additional information to consider includes local stratigraphy, structure, water levels and potentiometric surface, historical groundwater use, and potential sources of contamination. Khan et al. (2008) identified and ranked potential locations for ASR wells in New South Wales, Australia by considering factors such as water availability, aquifer suitability, recharge potential, and recovery efficiency. It is also critical to determine the lithology of the aquifer because the porosity and permeability of the rock can have significant effects on the behavior of stored water. According to Ward et al. (2008), fresh water injected into a brackish aquifer results in density-induced flow of the freshwater towards the top of the well, allowing brackish water to flow into the bottom of the well. They created a model of a lithologically heterogeneous aquifer with layers of high and low permeabilities and showed that this aquifer would reduce the effect of density-induced flow (Ward et al., 2008). Elewa et al. (2010) compiled data from well records, pumping tests, and hydrochemical analyses to assess the Darb el-Arbain area in Egypt for possible ASR development. They used those data to create a GIS model to locate the most suitable areas for ASR development. The parameters for the model included depth to groundwater, groundwater salinity, sodium absorption ratio, hydraulic conductivity, and yield (Elewa et al., 2010). The Normalized Difference Water Recovery Index (NDWRI) was created to help assess the feasibility of a site for ASR and considers aquifer recharge and productivity. In this index aquifer productivity is a

function of well yield, drawdown, and saturated thickness while recharge is a function of rainfall and the recharge coefficient (Bhuiyan, 2015).

3.2 Artificial Recharge in Colorado

The earliest investigations of artificial recharge in Colorado were conducted by the USGS by using spreading basins to artificially recharge alluvial aquifers of the Upper Black Squirrel Creek and South Platte River basins (Emmons, 1977; Burns, 1984). The first ASR projects in Colorado were preliminary studies conducted by Parker Water and Sanitation District and Willows Water District in the 1980s (Topper et al., 2004). Implementation of artificial recharge and ASR in Colorado have been limited in comparison to the extent of ASR implementation in states like California and New Jersey. According to Topper et al. (2004), the factors limiting artificial recharge and ASR in Colorado include lack of source water, lack of funding, and permitting issues. They also assessed the feasibility of artificial recharge statewide, ranking alluvial and bedrock aquifers by potential suitability for artificial recharge. The top ranked bedrock aquifers include the High Plains, Dawson, and Dakota-Cheyenne Aquifers among others but no mention was made of the Fountain Formation. The bedrock aquifers considered are significantly higher in the sedimentary section compared to the Fountain. The parameters they considered include areal extent, depth to top of formation, saturated thickness, head freeboard, storage coefficient, and hydraulic conductivity.

As of 2004, there were 19 active artificial recharge projects in the state of Colorado, with only 2 being ASR sites. The 17 non-ASR recharge sites are mostly

surface infiltration operations and are used for multiple objectives including water storage, aquifer restoration, and water quality improvement. Both operational ASR wellfields are being used for water storage and aquifer restoration in the Denver Basin. This method of water management is successful in the Denver Basin because of declining water levels in its aquifers. The first ASR site was built in 1992 for Centennial Water District in the Arapahoe, Denver, and Laramie-Fox Hills Aquifers with source water coming from the South Platte River. The second site was built in 1998 for Castle Pines Metropolitan District in the Arapahoe Aquifer and obtains source water from wells in the Denver Aquifer (Topper et al., 2004).

CHAPTER 4. METHODS

4.1 Study Area

The study area is along the eastern flank of the Front Range from the Colorado-Wyoming border to Pueblo County, CO. This area is approximately 205 miles long and encompasses the entire Fountain Formation outcrop within Colorado and the adjacent area (typically 1 to 2 miles wide) where the formation is still shallow enough for a water well (Fig. 4). Samples for permeability testing were obtained from outcrops west of Fort Collins, CO. Data from the Colorado Division of Water Resources AquaMap database were collected from 34 quadrangles within the study area (Fig. 5).

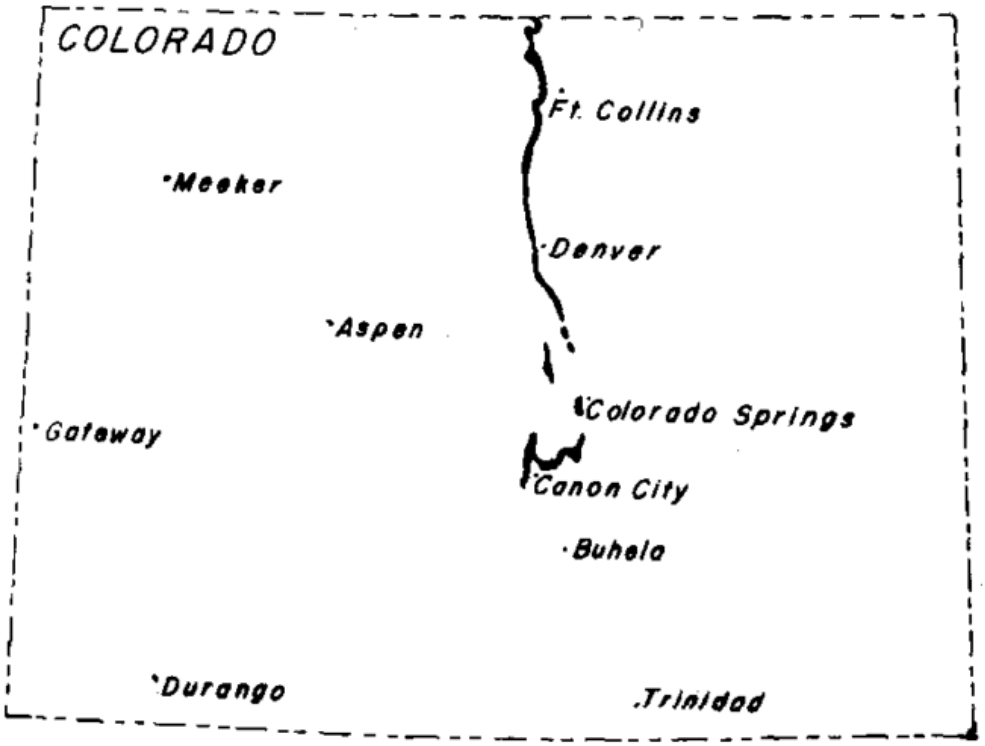


Figure 4. Map of the Fountain Formation outcrop within Colorado (from Howard, 1966).

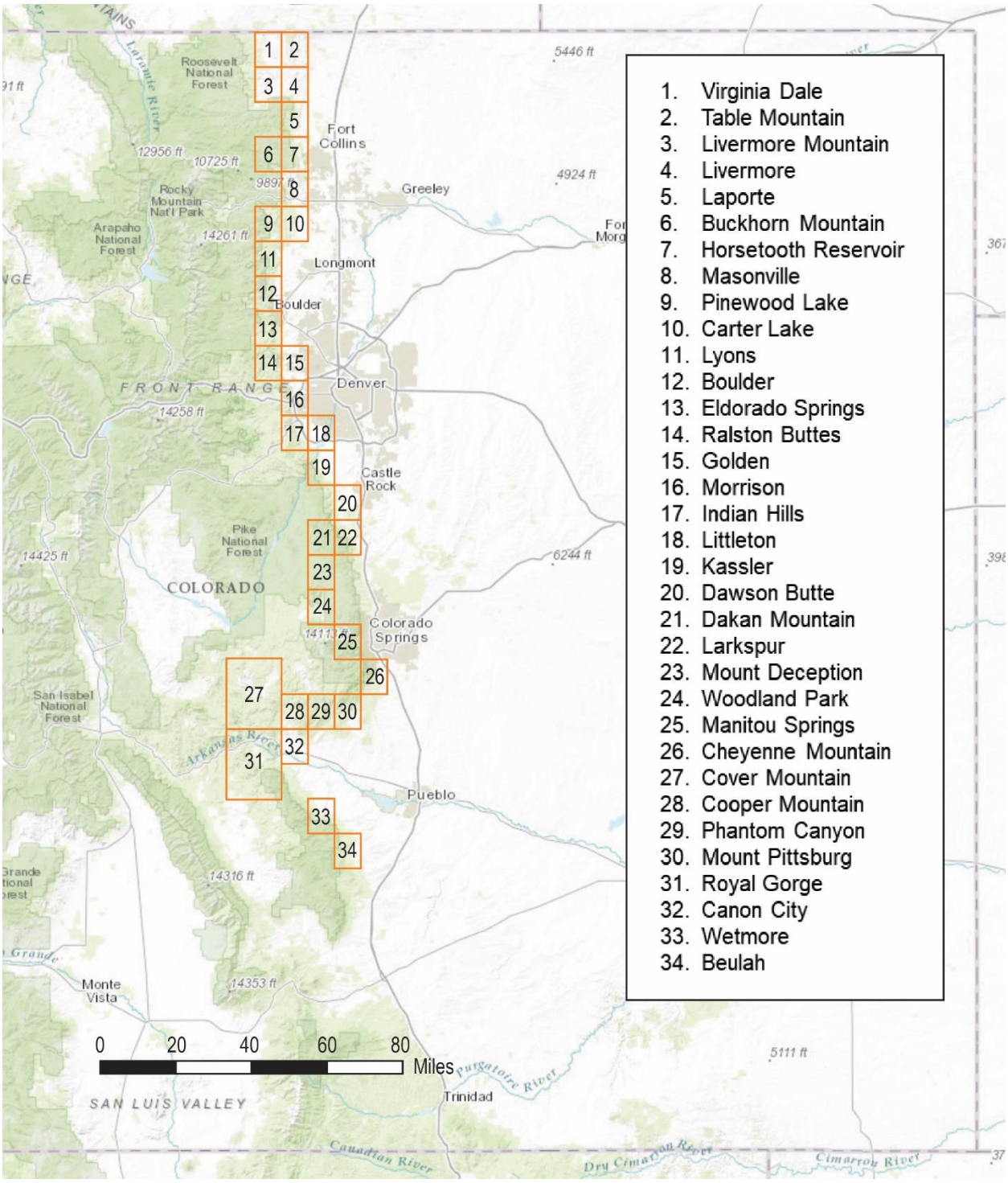


Figure 5. Map of all the quadrangles used in this study.

4.2 Field Work

Seven hand samples were collected from an outcrop at the Owl Canyon roadcut approximately 14 miles northwest of Fort Collins, Colorado along U.S. highway 287 (Fig. 6). Samples were selected to represent every facies present within the Fountain but some facies were too friable to collect a large enough sample. Care was taken to find the least weathered samples from the outcrop but all samples exhibit at least some degree of modern weathering.

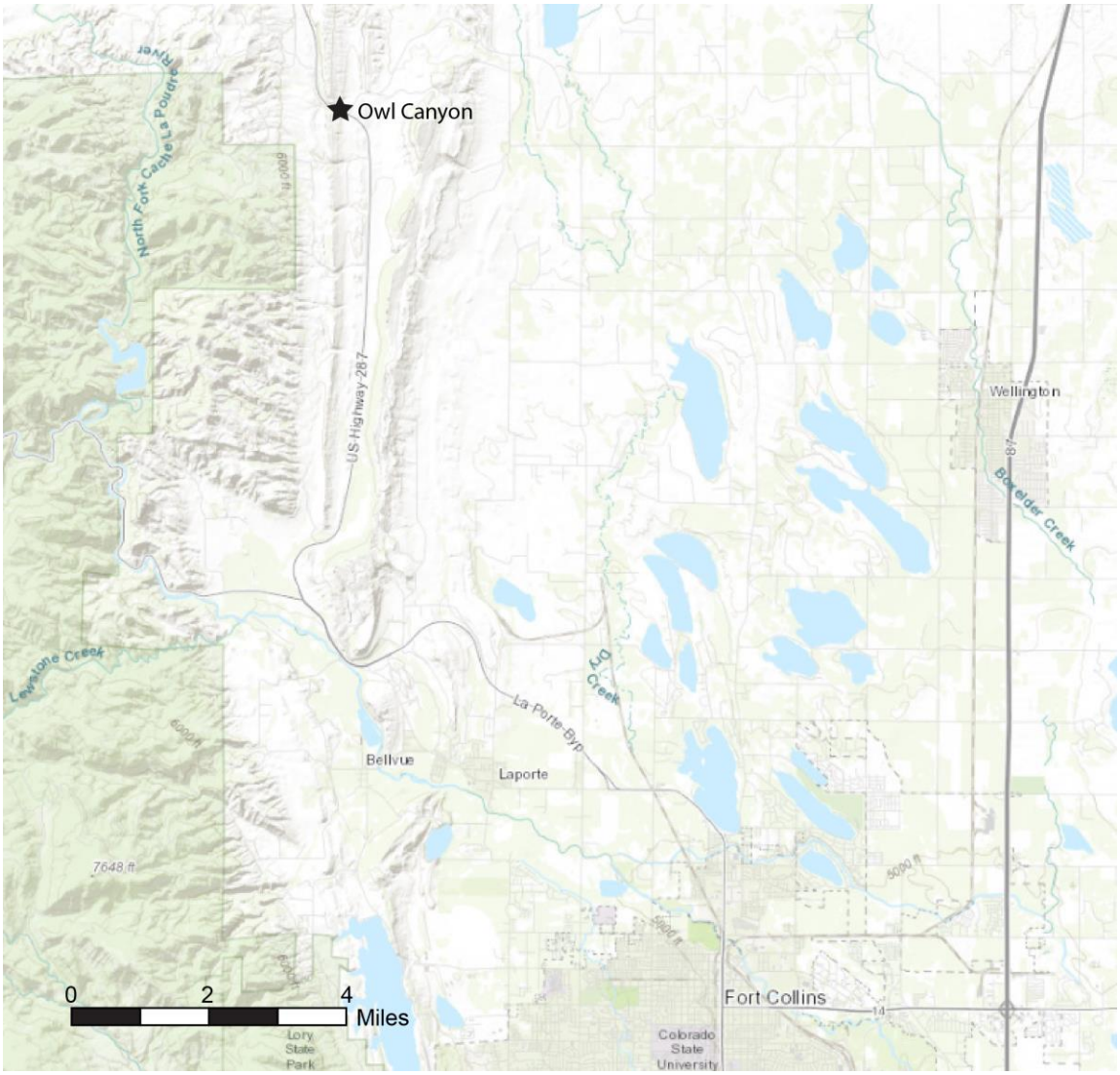


Figure 6. Map of the Fort Collins area and location of Owl Canyon field site.

4.3 AquaMap Data

Data from water wells in the Fountain Formation were obtained from the AquaMap database maintained by the Colorado Division of Water Resources. The data correspond to wells within the 34 quadrangles included in the study area. Data were collected from a total of 1262 well records. These records are typically in the format of a well construction and test report, which includes data on the type of well being drilled (e.g. domestic or municipal), total depth, the geographic coordinates of the well, and a geologic log (e.g. Fig. 7). These reports also include data from a pump test including yield, static water level, pumping water level, and testing method. The geologic log typically reports the changing lithology with depth and sometimes includes formation names. Most logs did not use formation names so wells that were drilled into the Fountain Formation were identified using geologic maps and cross sections in conjunction with the geographic coordinates, lithologic descriptions, and depths. Unfortunately, the well reports submitted vary in quality and some reports are missing one or more pieces of information (e.g. Fig. 8). Some reports have a lithologic log lacking sufficient detail to determine the formation the well was completed in and were not usable in this study.

FORM NO. GWS-31 01/93

WELL CONSTRUCTION AND TEST REPORT
STATE OF COLORADO, OFFICE OF THE STATE ENGINEER

For Office Use only

RECEIVED

MAR 3 '95

WATER RESOURCES STATE ENGINEER COLO

1. **WELL PERMIT NUMBER** 183812

2. OWNER NAME(S) STEVE & CINDI KESTREL
Mailing Address 532 CRESTMORE PL
City, St. Zip FT COLLINS CO 80521
Phone (303) 482-9418

3. WELL LOCATION AS DRILLED: NW 1/4 NE 1/4, Sec. 27 Twp. 7 N, Range 70 W
DISTANCES FROM SEC. LINES:
1000 ft. from NORTH (north or south) Sec. line. and 1900 ft. from EAST (east or west) Sec. line. OR
SUBDIVISION: LOT BLOCK FILING(UNIT)
STREET ADDRESS AT WELL LOCATION:

4. GROUND SURFACE ELEVATION ft. DRILLING METHOD AIR-PERCUSSION
DATE COMPLETED 1-24-95. TOTAL DEPTH 400 ft. DEPTH COMPLETED 400 ft.

5. GEOLOGIC LOG:

Depth	Description of Material (Type, Size, Color, Water Location)	
0-12	SANDY CLAY SOFT	
12-261	RED SANDSTONE MED	
261-344	PINK SANDSTONE MED	
344-348	GRAY SANDSTONE MED	XX
348-400	RED SANDSTONE MED	

The testing of production of water from this well, as reflected by this report, is totally dependent upon conditions existing as of the date of testing and does not reflect any projection as to future production. This is dependent on future conditions.

REMARKS:

6. HOLE DIAM. (in.)

	From (ft)	To (ft)
10	0	20
6	20	400

7. PLAIN CASING

OD (in)	Kind	Wall Size	From(ft)	To(ft)
6-5/8	STEEL	.188	0	20
4-1/2	PVC	.214	10	340

PERF. CASING: Screen Slot Size: .032

4-1/2	PVC	.214	340	400

8. FILTER PACK:
Material
Size
Interval

9. PACKER PLACEMENT:
Type
Depth

10. GROUTING RECORD:

Material	Amount	Density	Interval	Placement
NEAT CEMENT	2-BAGS	15.5	20'	POURED

11. DISINFECTION: Type DRY-HTH Amt. Used 1.5-CUPS

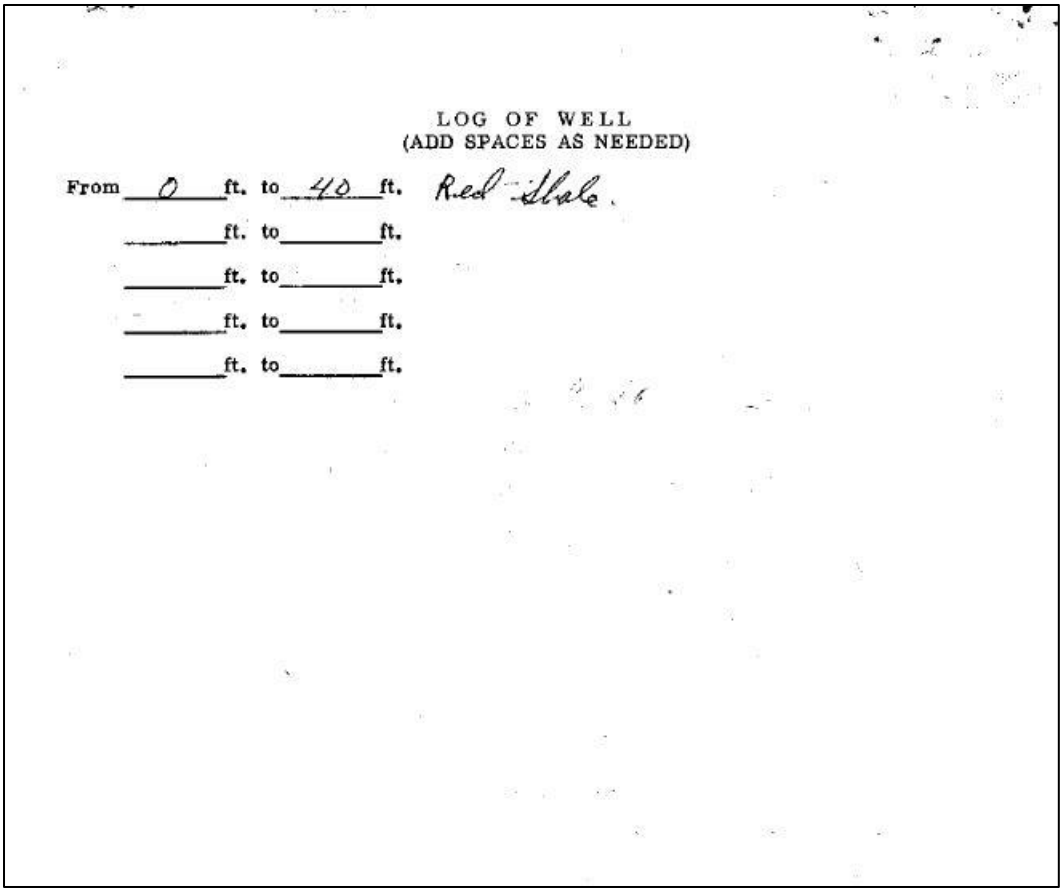
12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form No. GWS 39 Supplemental Well Test.
TESTING METHOD AIR-LIFT
Static Level 40 ft. Date/Time measured 1-23-95, Production Rate 1.4 gpm.
Pumping level 400 ft. Date/Time measured 1-23-95, Test length (hrs.) 2
Remarks

13. I have read the statements made herein and know the contents thereof, and that they are true to my knowledge. [Pursuant to Section 24-4-104 (13)(a) C.R.S., the making of false statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.]

CONTRACTOR INGRAM DRILLING, INC. Phone (303) 586-4542 Lic. No. 1099
Mailing Address P. O. BOX 342 ESTES PARK, CO 80517

Name/Title (Please type or print)	Signature	Date
STEPHEN E. INGRAM PRESIDENT		2-11-95

Figure 7. A typical well construction and test report.



LOG OF WELL
(ADD SPACES AS NEEDED)

From 0 ft. to 40 ft. Red Shale.
_____ ft. to _____ ft.
_____ ft. to _____ ft.
_____ ft. to _____ ft.
_____ ft. to _____ ft.

Figure 8. A well report missing most of the typical data.

The data collected were used to calculate specific capacity, which is the yield divided by the drawdown and can provide an approximation of potential well yield with varying drawdown. Specific capacity is calculated as follows:

Specific Capacity, $SC = Q/s$

Where:

Q is the yield of the well, in gallons per minute (GPM);

s is drawdown in the well, in feet;

and $s = d - d_0$,

where:

d_0 is the static water level;

d is the pumping water level.

Some well records reported a drawdown of zero or were missing one or more of the necessary variables so these wells were excluded from the calculation.

The yields and calculated specific capacities of each well were plotted on maps using ArcGIS to help identify areas of interest for ASR and to assess the Fountain Formation as an aquifer. Water level elevation maps were made for quadrangles with enough data points and promising specific capacities by using the collected AquaMap data and the interpolation and contour tools in ArcGIS.

4.4 Permeability

The hand samples collected from outcrop were tested for permeability using an air permeameter (Brooks and Corey, 1964). The samples were first prepared for the permeameter by cutting them with a saw into 2-inch-thick blocks and then a one-inch diameter core was drilled for each block. Unfortunately, only well-cemented samples could be cut into the cylindrical shape necessary for testing in the air permeameter. Less cemented samples were too friable to be cut or drilled into. The samples were then tested with the air permeameter (Fig. 9). Detailed operating procedures were developed for this study and can be found in the Appendix.

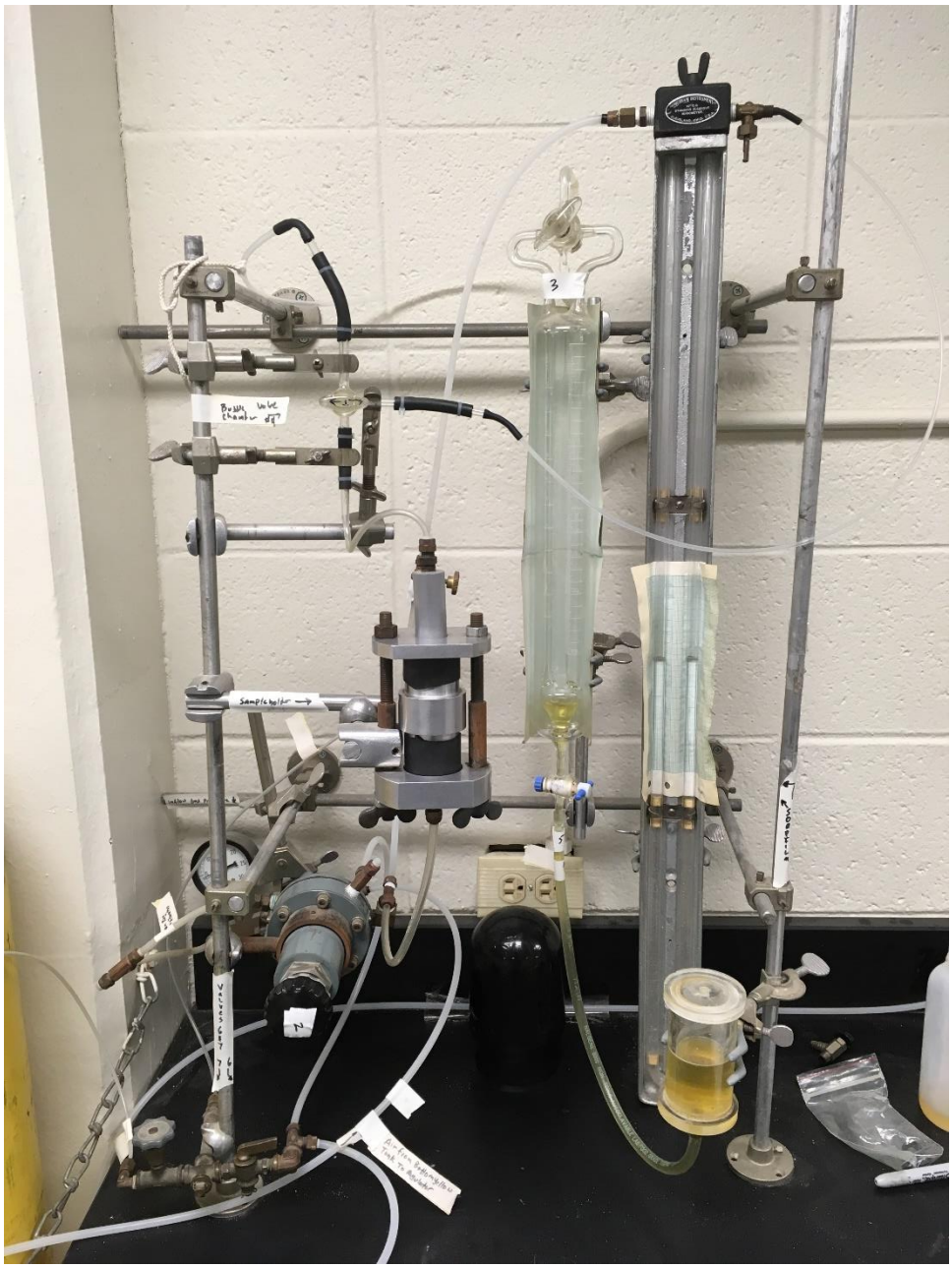


Figure 9. The air permeameter device in the Department of Civil and Environmental Engineering at CSU.

CHAPTER 5. RESULTS

5.1 Fountain Formation Well Data

A total of 1084 wells were found completed in the Fountain Formation. The full dataset can be found in the Appendix. The location of wells coincide with the Fountain Formation outcrop in Colorado (Fig. 10). There are several types of well in the Fountain Formation with 76% of wells being household or domestic wells (Fig. 11). The other well types are irrigation, stock, municipal, commercial, and monitoring. The wells are located all along the Front Range with most of the wells being in Larimer and Teller counties (Fig. 12). The distribution of wells is further divided by quadrangle and well type in Table 1 and varies from as little as 1 well in the Cover Mountain quadrangle to 171 wells in the Mount Deception quadrangle. Other quadrangles with a high concentration of wells include the Lyons, Morrison, and Woodland Park quadrangles.

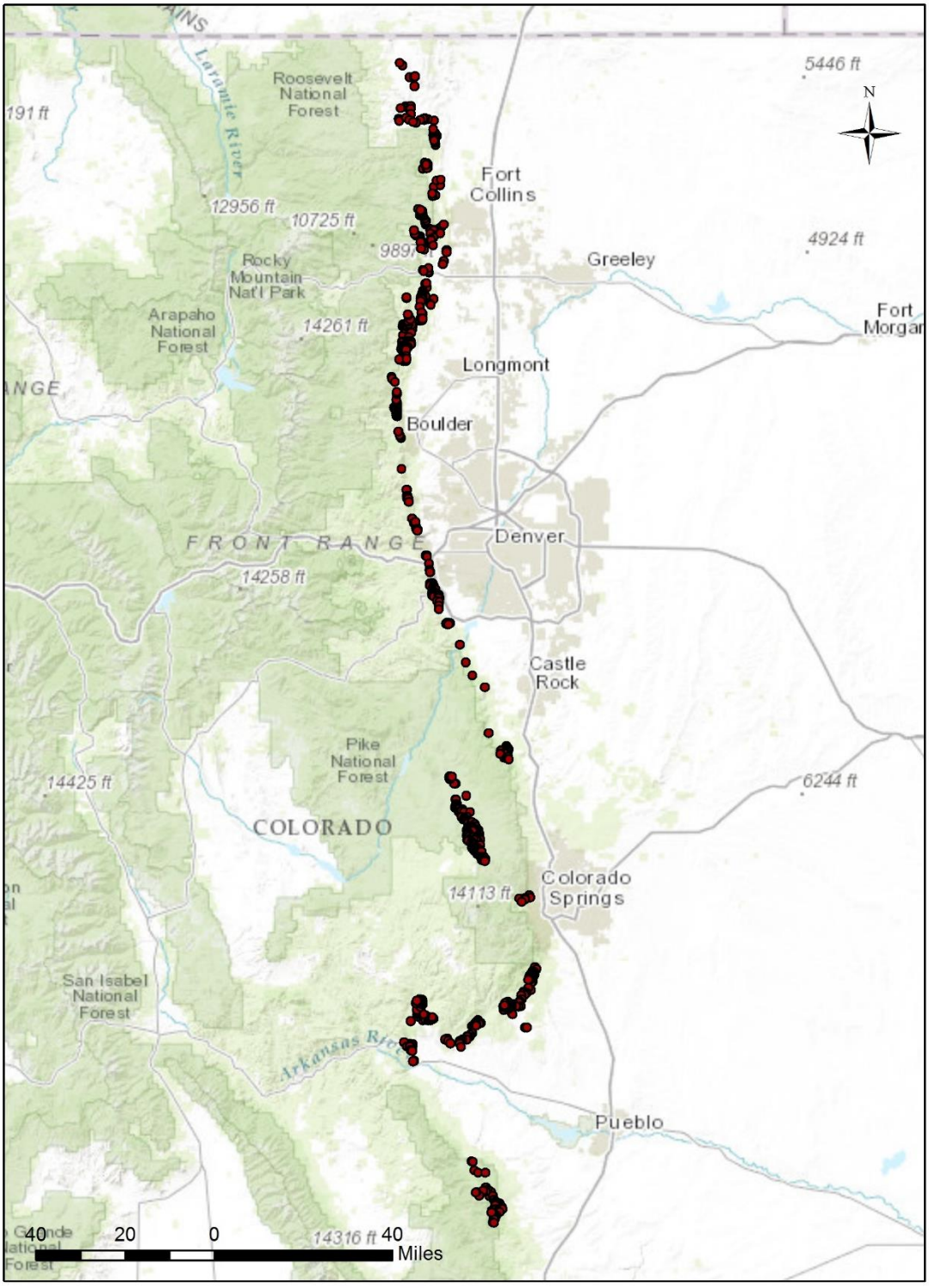


Figure 10. All the Fountain water wells in Colorado found in this study.

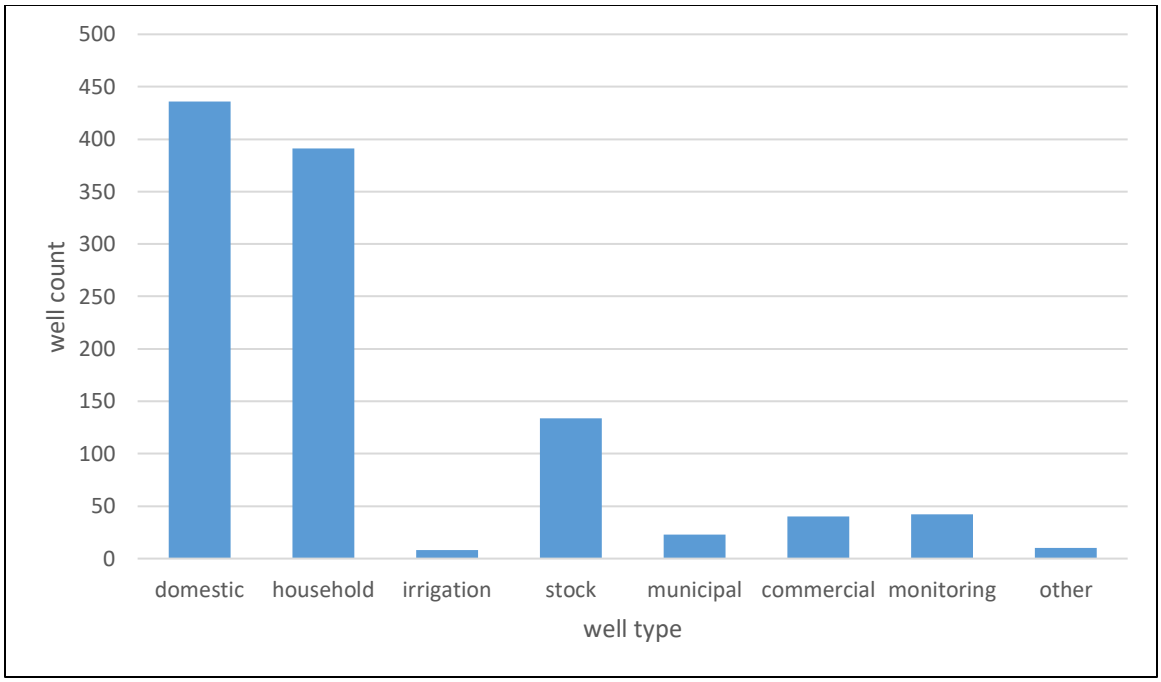


Figure 11. Distribution of all Fountain wells by well type.

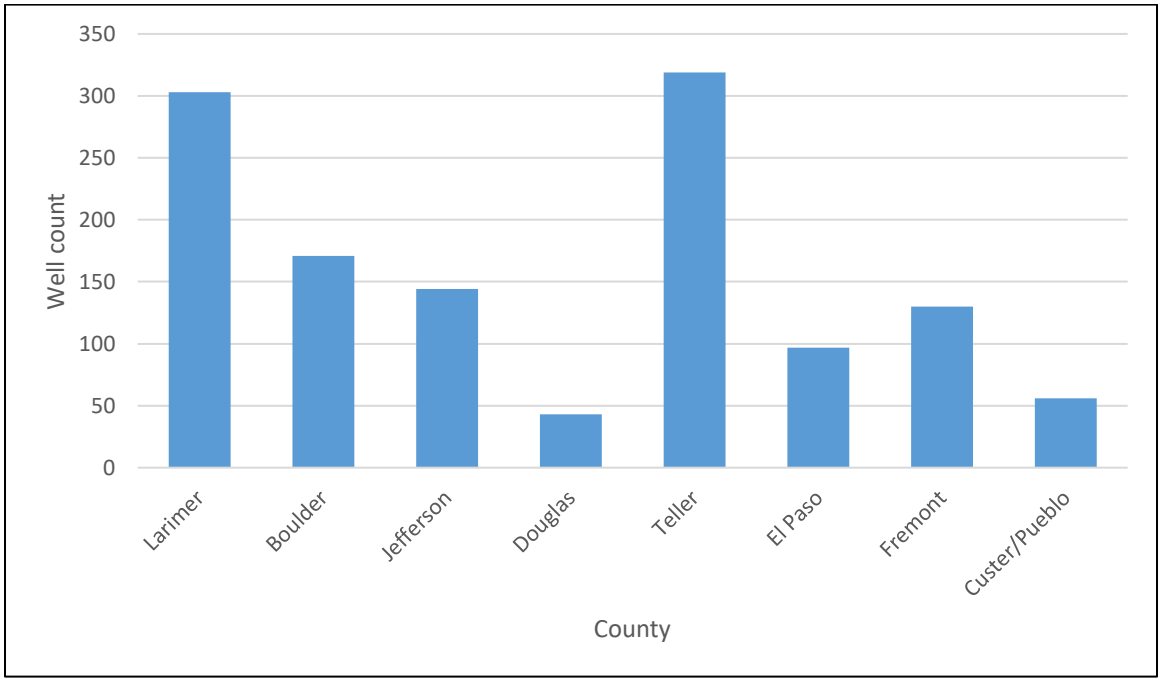


Figure 12. Distribution of all wells by county.

Table 1. Distribution of Fountain Formation wells by quadrangle and well type.

quadrangle	county	household	domestic	irrigation	stock	municipal	commercial	monitoring	other	total
Virginia Dale	Larimer		5							5
Table Mountain	Larimer				1					1
Livermore Mountain	Larimer	1	7		4		1		1	14
Livermore	Larimer	4	8		4		1		2	19
Laporte	Larimer	10	19		3				1	33
Buckhorn Mountain	Larimer	1								1
Horsetooth Reservoir	Larimer	6	34		4		1			45
Masonville	Larimer	3	24		2		1			30
Pinewood Lake	Larimer	10	17					1		28
Carter Lake	Larimer	20	14		1		1		1	37
Lyons	Boulder	65	19	1	1		1			87
Boulder	Boulder	21	23	1	2	2	2			51
Eldorado Springs	Boulder		1				1	1		3
Ralston Buttes	Jefferson		7		1					8
Golden	Jefferson		6		1					7
Morrison	Jefferson	20	20		4	1	5	3		53
Indian Hills	Jefferson	20	13	1	4		1			39
Littleton	Jefferson							12		12
Kassler	Douglas		2		1			3	2	8
Dawson Butte	Douglas				1			1		2
Dakan Mountain	Douglas	8	4							12
Larkspur	Douglas	2	6		7			7		22
Mount Deception	Teller	67	57		11	17	9	9	1	171
Woodland Park	Teller	106	35	2		1	8	1	1	154
Manitou Springs	El Paso		4		2					6
Cheyenne Mountain	El Paso	2	14	1	5	2		3	1	28
Cover Mountain	Fremont				1					1
Cooper Mountain	Fremont		26	1	17					44
Phantom Canyon	Fremont	2	12		17					31
Mount Pittsburg	El Paso	5	26		22		2	1		56
Royal Gorge	Fremont	6	8		3		1			18
Canon City	Fremont		2							2
Wetmore	Custer	2	9		7		3			21
Beulah	Pueblo	10	14	1	8		2			35
Total		391	436	8	134	23	40	42	10	1084

5.2 Fountain Formation Production

The yields for the Fountain Formation range from 0.1 GPM to 379 GPM and vary by county (Fig. 13). The highest average yields are in Fremont and Pueblo counties. Domestic and household type wells make up most wells but are on average the lowest producing type. However there a few high yield outliers in the domestic well type with a maximum yield of 300 GPM. The highest yield well is a commercial well and the well types with the highest Q1, median, and Q3 are municipal and irrigation wells (Fig. 14). Yields also vary by quadrangle with the highest average yields in the Carter Lake and Dawson Butte quadrangles (Table 2). Other quadrangles with higher average production values include the Lyons, Golden, Mount Deception, Cooper Mountain, and Beulah quadrangles. Figures 15 to 22 display the yields by quartile for each quadrangle and are grouped by county. All of the Fountain wells and the corresponding yields and depths were plotted on topographic maps (Figures 23 to 58). Most wells are on top of or near the outcrop of the Fountain Formation and thus appear in linear north-south trending groups (e.g. Fig. 34). Wells also appear in clusters around neighborhoods or around towns such as Lyons (Fig. 32) and Woodland Park (Figures 44 to 49). Yield does not appear to have a direct relationship to well depth (Fig. 59).

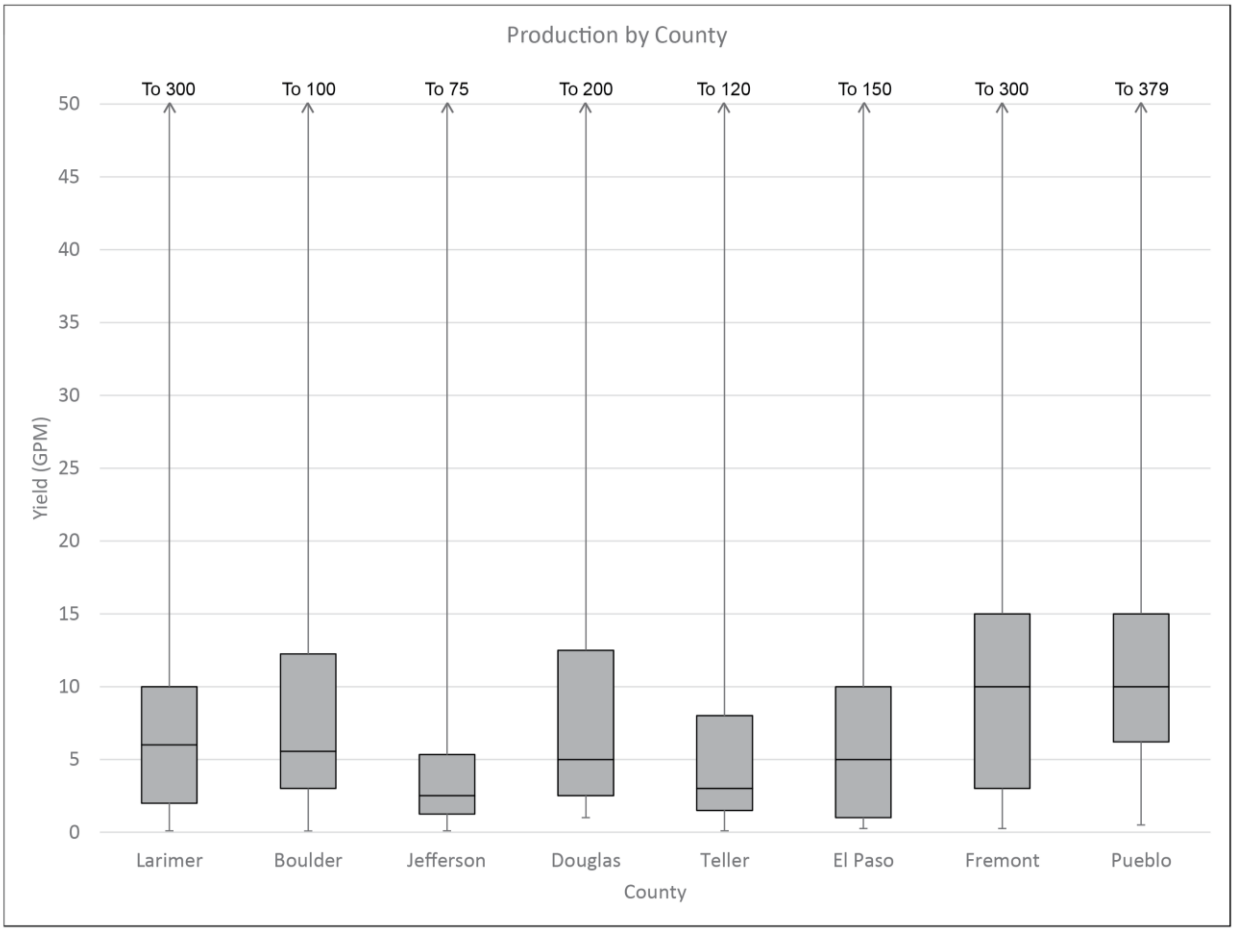


Figure 13. Box and whisker plot of well yields by county. This plot and the following plots show the maximum, upper quartile, median, lower quartile, and minimum values.

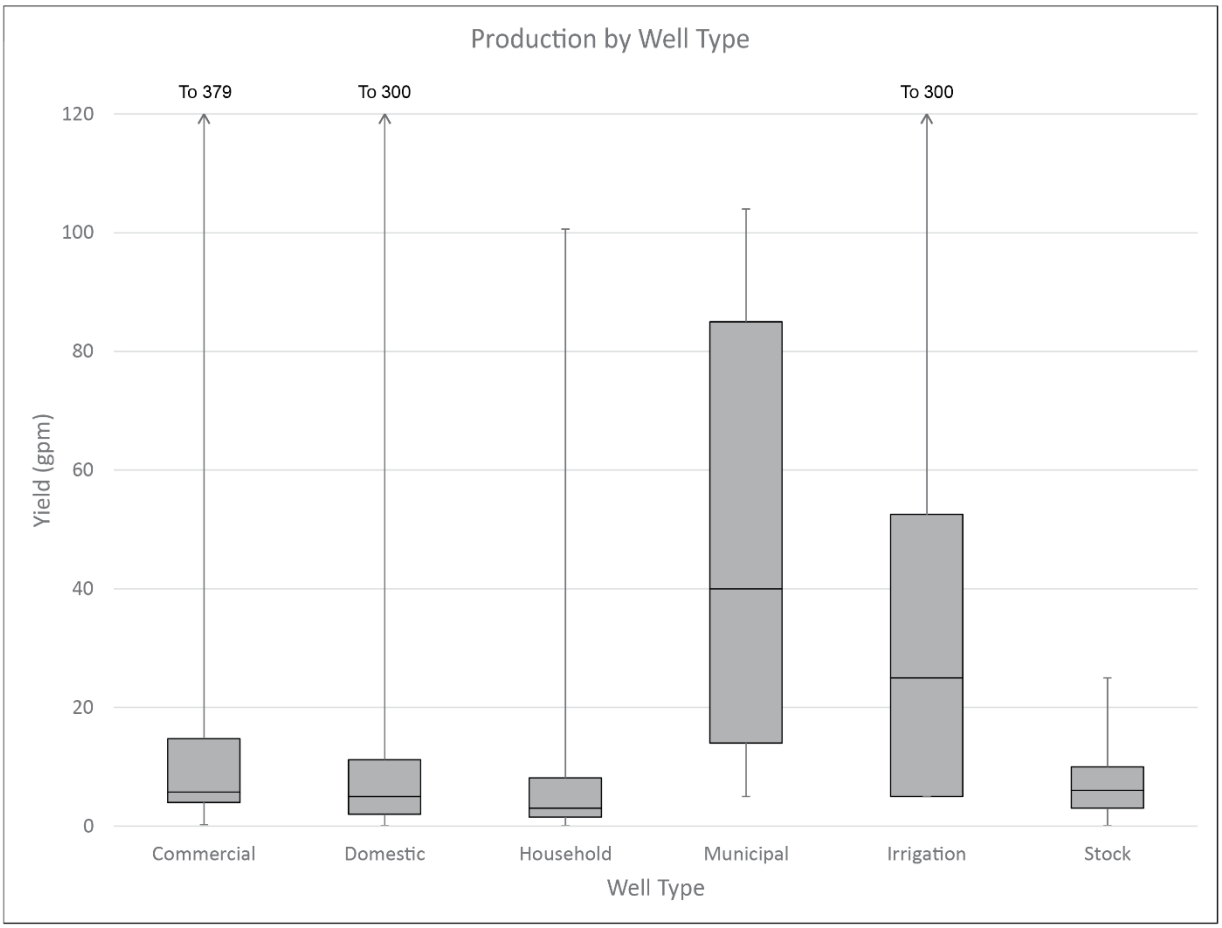


Figure 14. Box and whisker plot of well yields by well type.

Table 2. Statistics for Fountain well yields by quadrangle (values in gpm).

Quadrangle	county	minimum	Q1	median	Q3	maximum
Virginia Dale	Larimer	1.0	3.5	7.0	7.0	8.0
Table Mountain	Larimer	4.0	4.8	5.5	6.3	7.0
Livermore Mountain	Larimer	0.8	2.1	7.0	10.0	15.0
Livermore	Larimer	0.5	3.3	7.0	10.0	41.0
Laporte	Larimer	0.5	3.5	6.2	10.0	47.0
Buckhorn Mountain	Larimer	3.0	3.0	3.0	3.0	3.0
Horsetooth Reservoir	Larimer	0.2	1.0	4.1	7.4	15.0
Masonville	Larimer	0.6	3.1	5.0	10.0	15.0
Pinewood Lake	Larimer	0.1	1.0	4.0	15.0	35.0
Carter Lake	Larimer	0.8	6.5	16.0	37.5	300.0
Lyons	Boulder	0.1	4.5	7.5	15.0	100.0
Boulder	Boulder	0.1	2.0	3.3	5.3	40.0
Eldorado Springs	Boulder	4.0	5.5	7.0	8.5	10.0
Ralston Buttes	Jefferson	1.0	2.5	4.5	6.3	9.0
Golden	Jefferson	2.0	5.5	11.0	13.5	20.0
Morrison	Jefferson	0.1	1.0	2.0	4.8	35.0
Indian Hills	Jefferson	0.1	2.0	2.5	5.0	75.0
Kassler	Douglas	3.0	4.5	7.5	11.5	16.0
Dawson Butte	Douglas	15.0	15.0	15.0	15.0	15.0
Dakan Mountain	Douglas	1.0	2.0	4.0	8.9	27.0
Larkspur	Douglas	1.0	2.8	6.0	13.3	200.0
Mount Deception	Teller	0.1	2.0	4.5	10.5	120.0
Woodland Park	Teller	0.1	1.3	2.0	5.0	55.0
Manitou Springs	El Paso	1.0	2.6	7.3	10.0	60.0
Cheyenne Mountain	El Paso	0.3	1.0	4.0	6.0	60.0
Cover Mountain	Fremont	15.0	15.0	15.0	15.0	15.0
Cooper Mountain	Fremont	1.0	3.0	10.0	15.0	300.0
Phantom Canyon	Fremont	0.3	4.5	10.0	15.0	16.0
Mount Pittsburg	El Paso	0.3	1.3	5.0	12.5	150.0
Royal Gorge	Fremont	0.5	1.3	10.0	14.8	25.0
Canon City	Fremont	1.0	3.3	5.5	7.8	10.0
Wetmore	Custer	0.5	4.9	10.0	15.0	379.0
Beulah	Pueblo	0.8	6.8	11.0	15.0	30.0

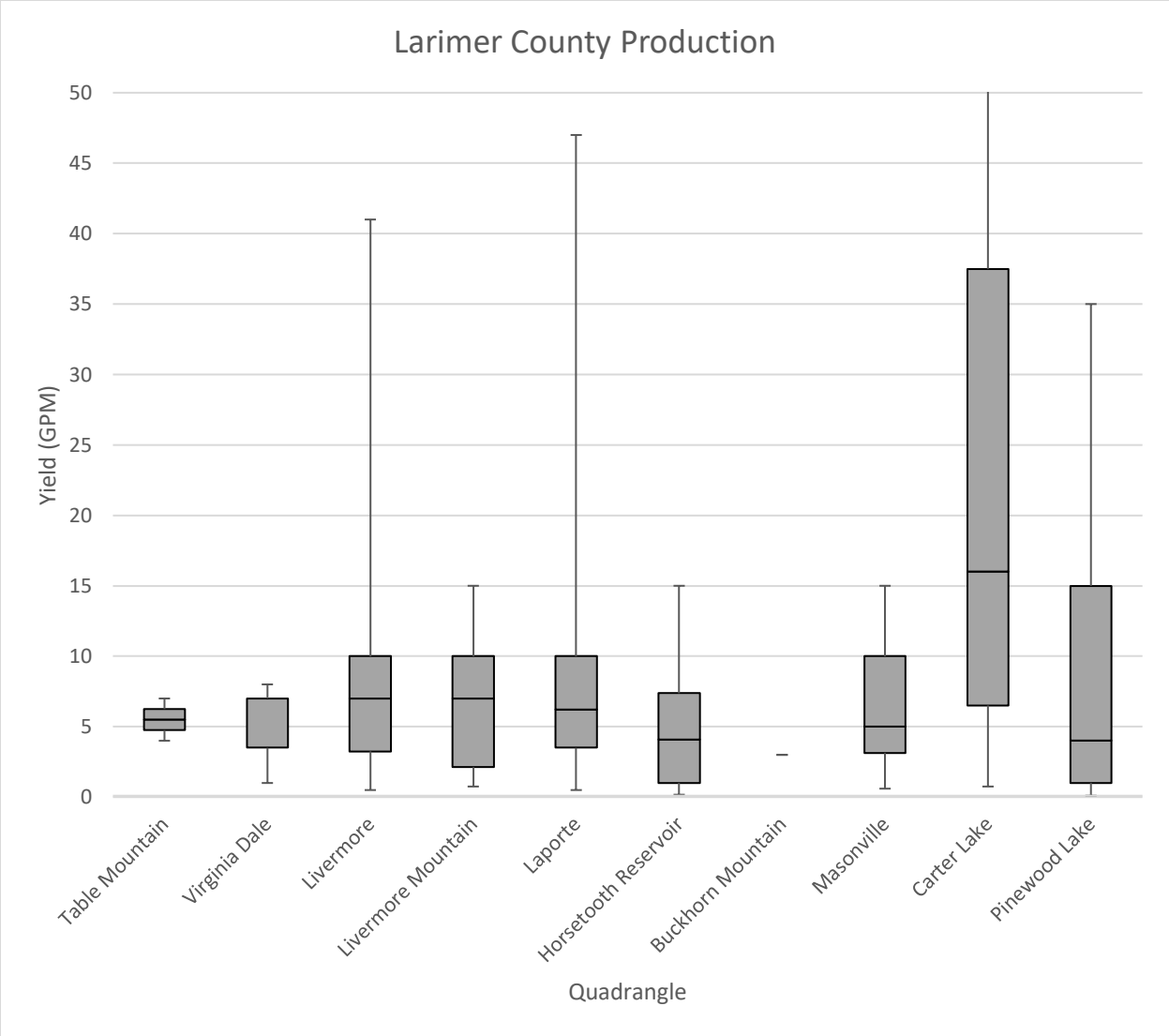


Figure 15. Box and whisker plot for well yields by quadrangles within Larimer County. The Carter Lake quadrangle maximum yield is 300 gpm.

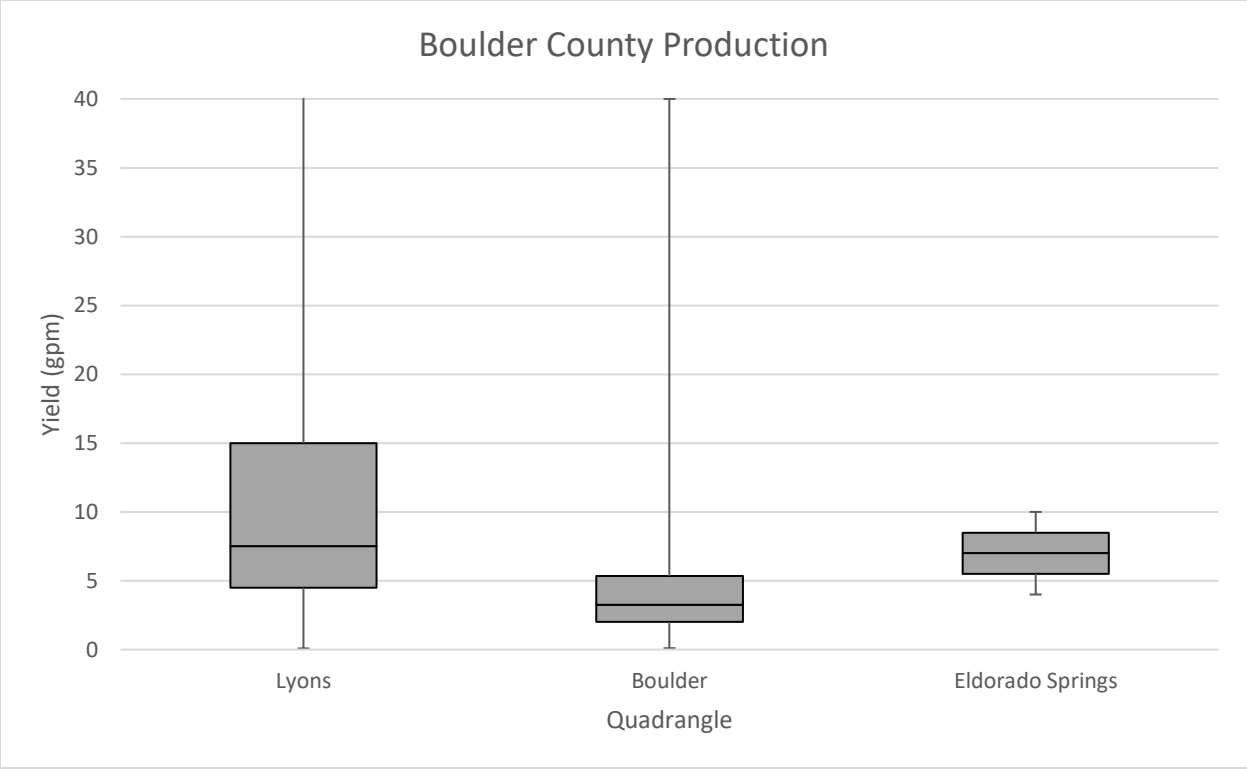


Figure 16. Box and whisker plot for well yields by quadrangles within Boulder County. The Lyons quadrangle maximum yield is 100 gpm.

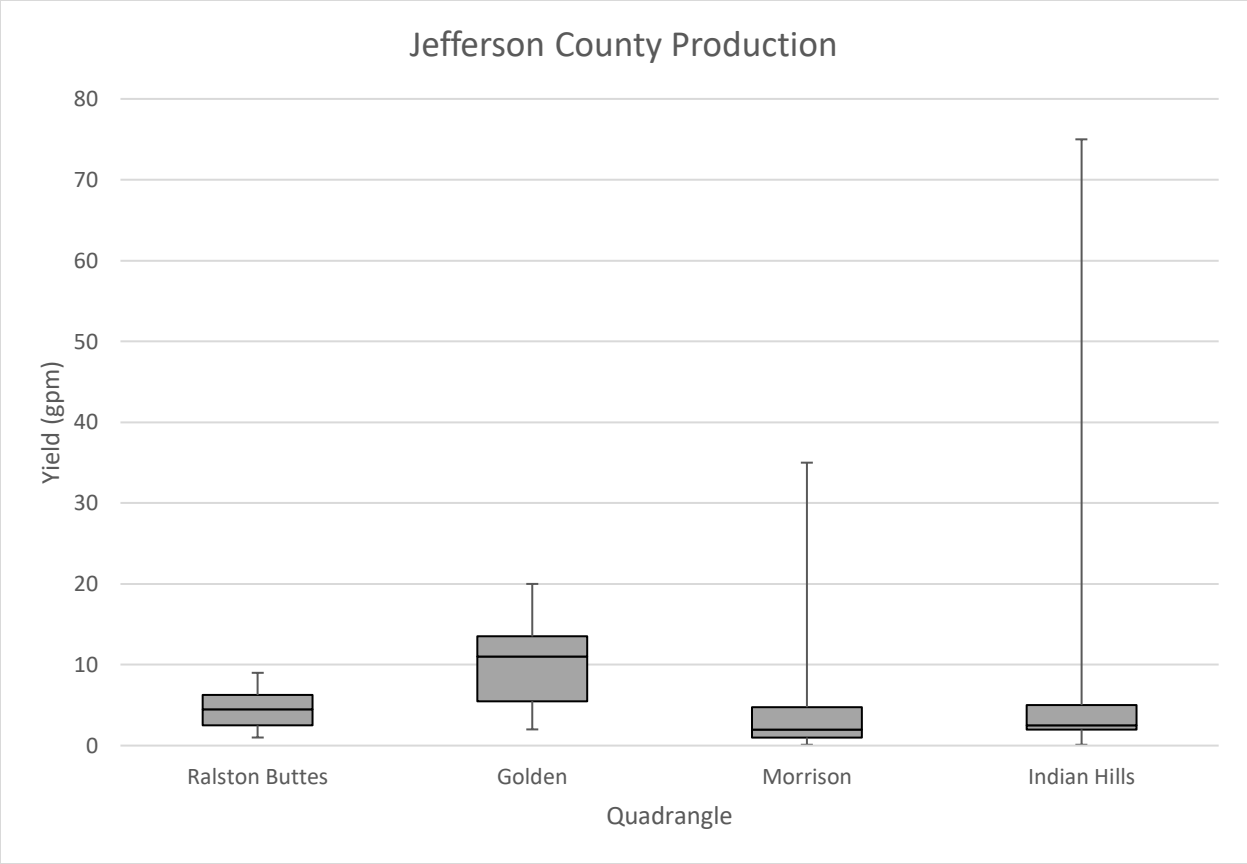


Figure 17. Box and whisker plot for well yields by quadrangles within Jefferson County.

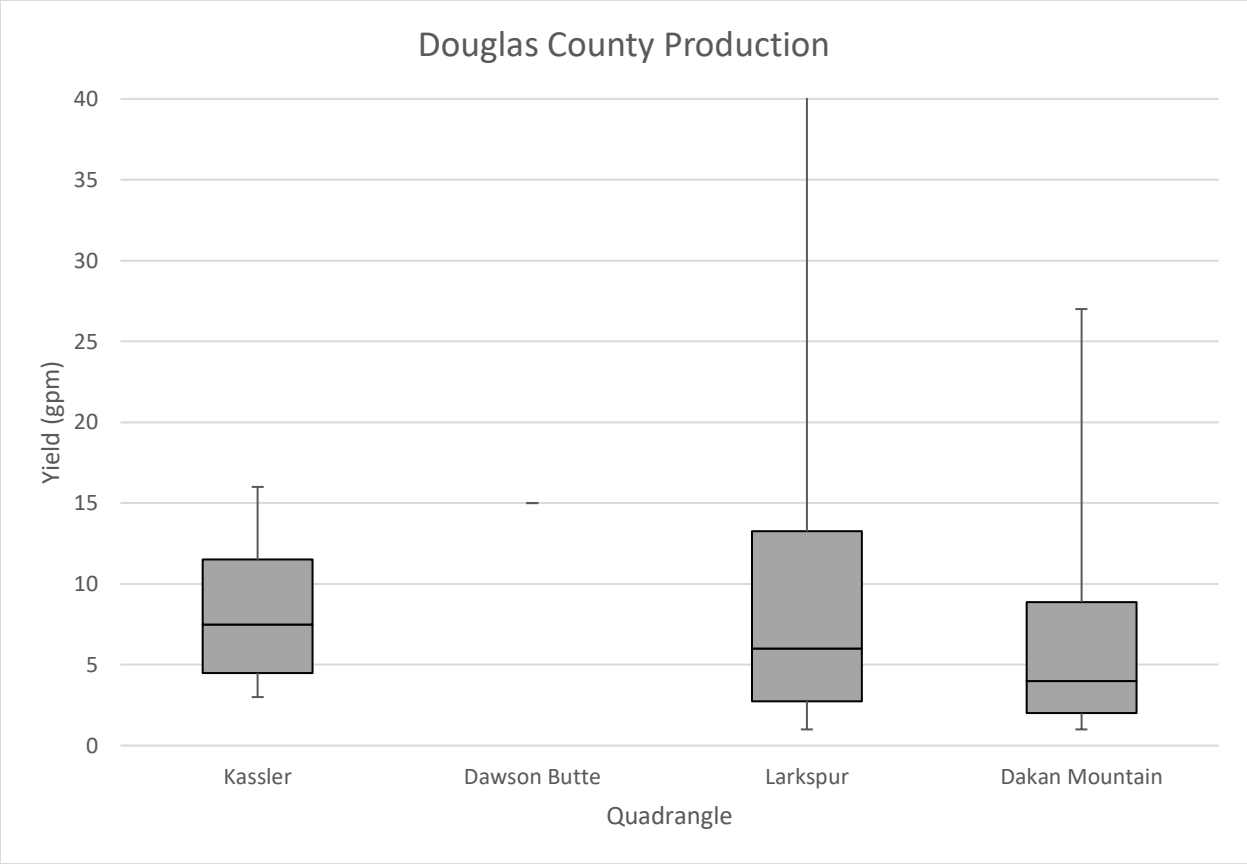


Figure 18. Box and whisker plot for well yields by quadrangles within Douglas County. The Larkspur quadrangle maximum yield is 200 gpm.

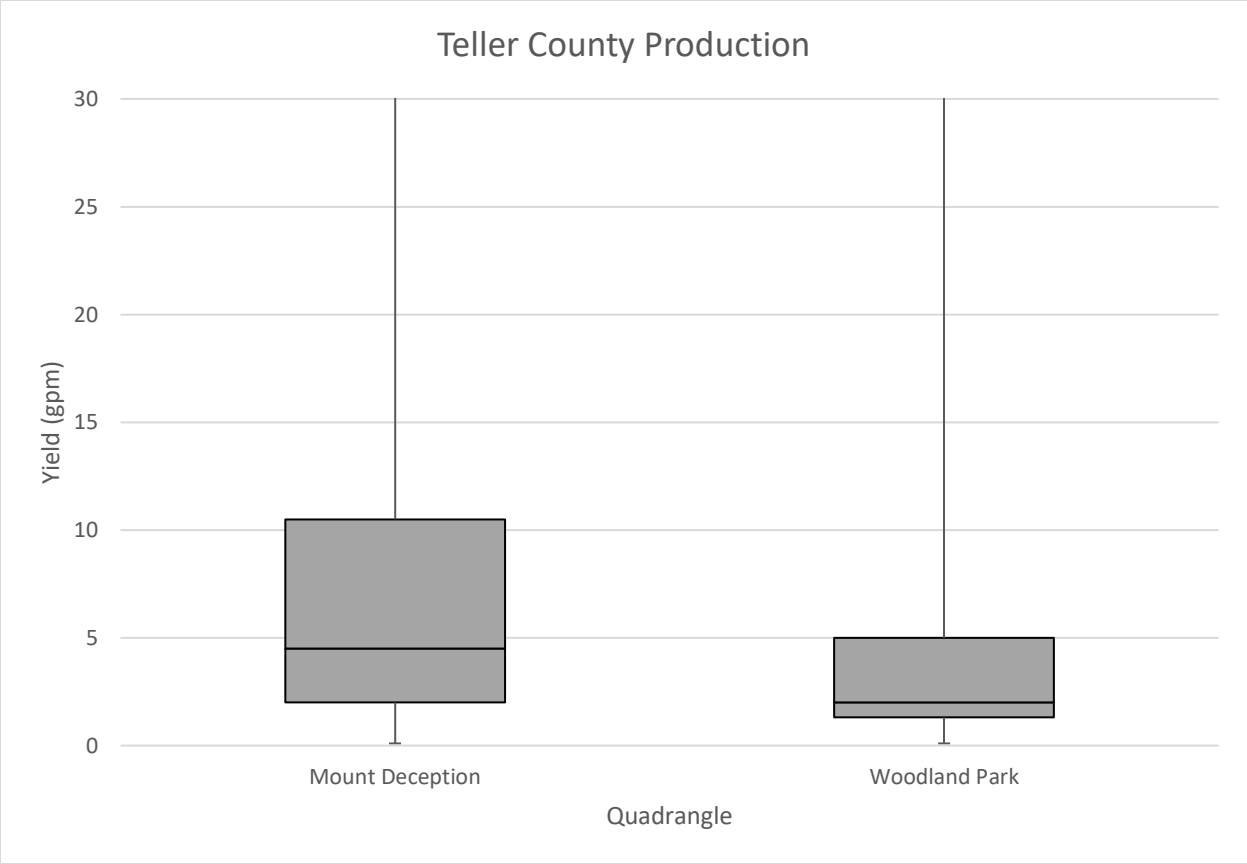


Figure 19. Box and whisker plot for well yields by quadrangles within Teller County. Mount Deception maximum yield is 120 gpm and Woodland Park maximum yield is 55 gpm.

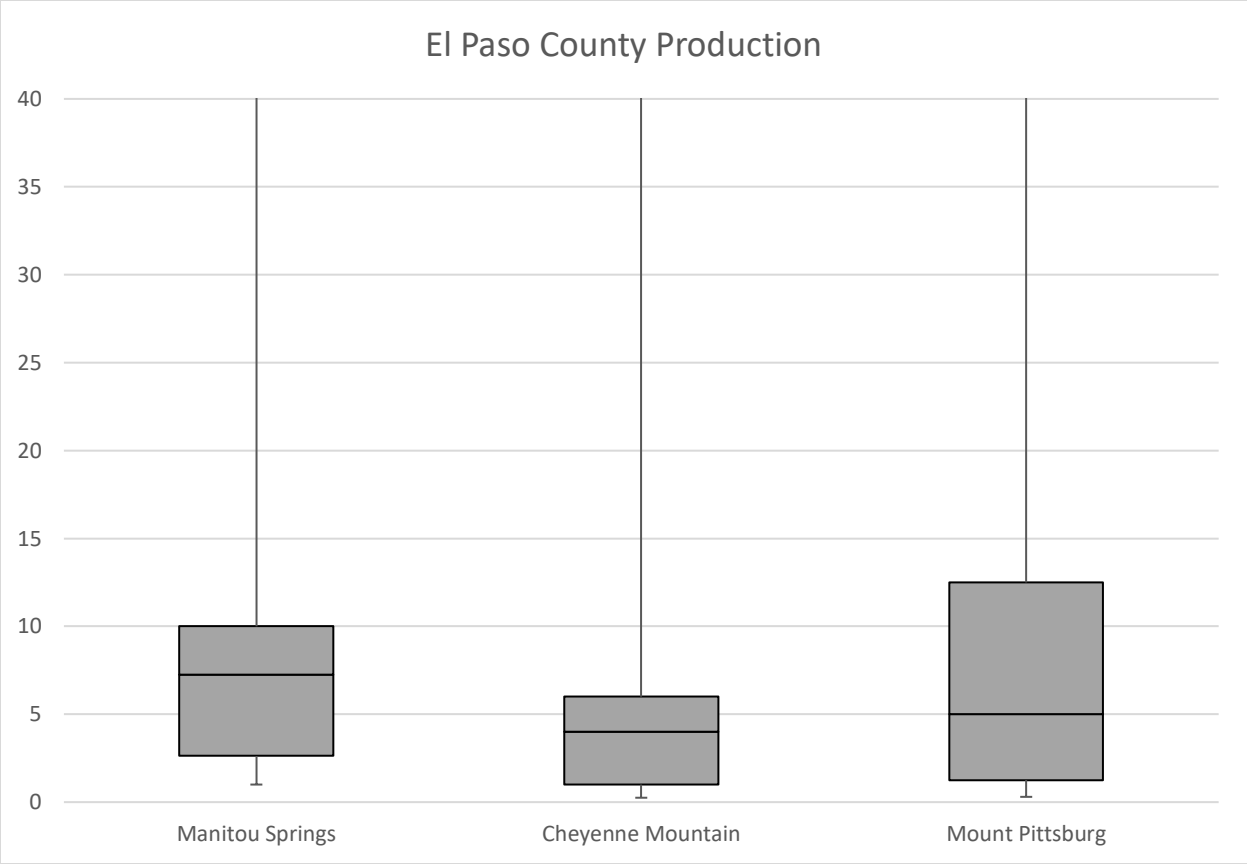


Figure 20. Box and whisker plot for well yields by quadrangles within El Paso County. Manitou Springs maximum yield is 60 gpm, Cheyenne Mountain maximum yield is 60 gpm, and Mount Pittsburg is 150 gpm.

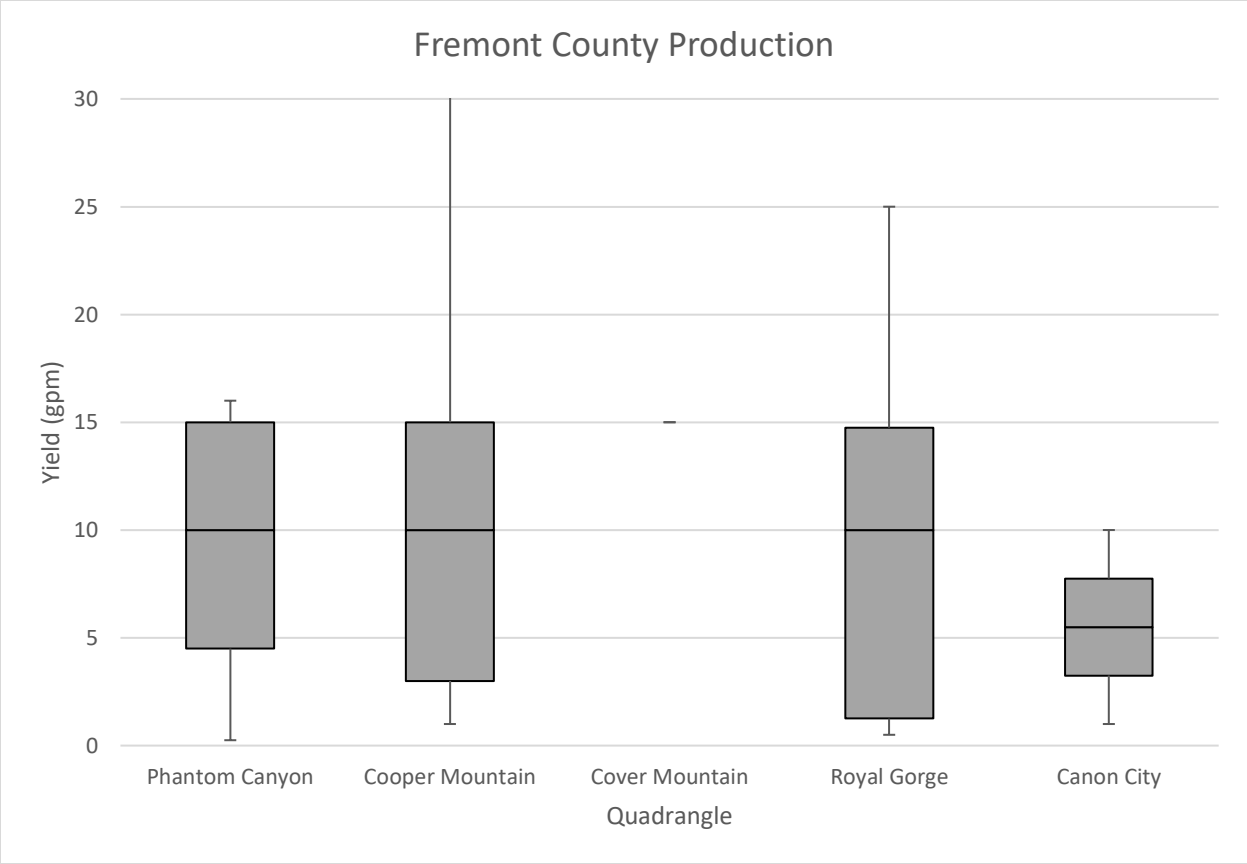


Figure 21. Box and whisker plot for well yields by quadrangles within Fremont County. Cooper Mountain maximum yield is 300 gpm.

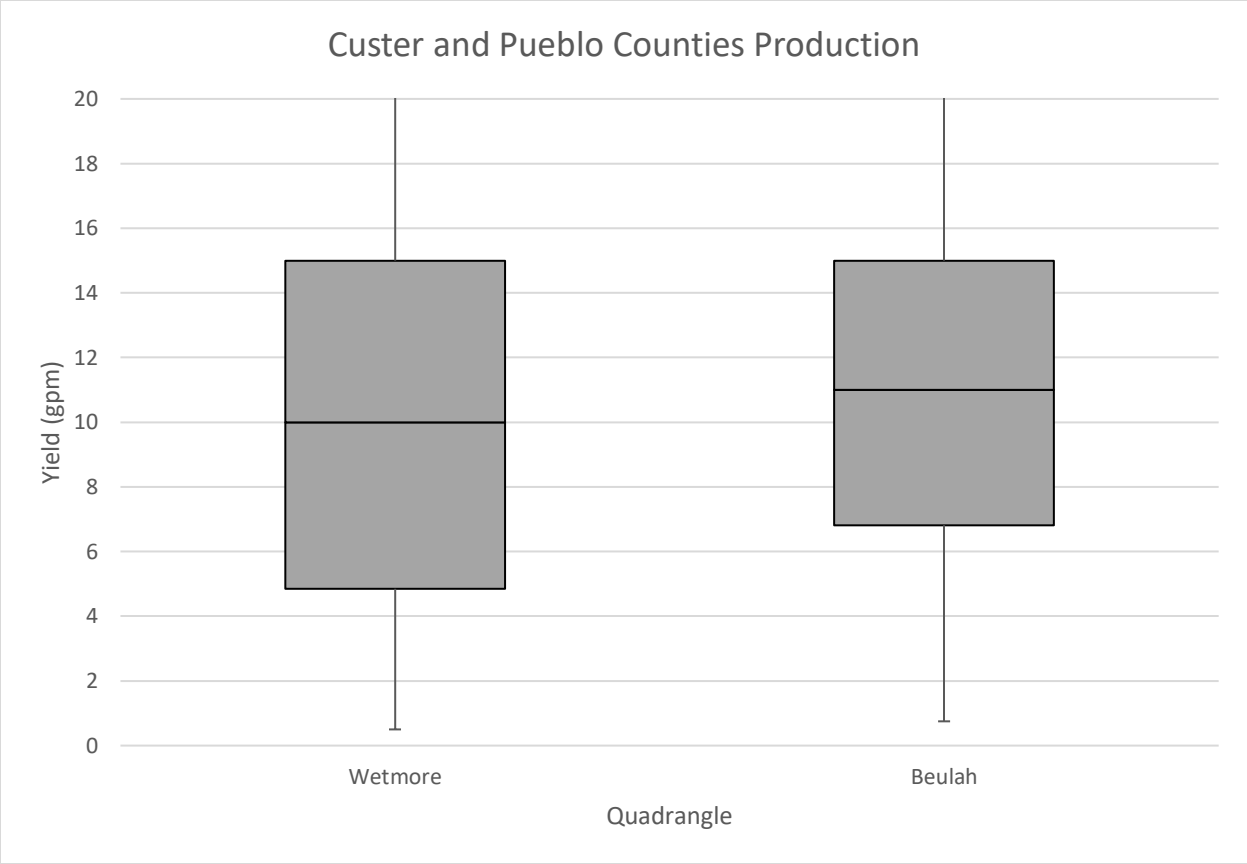


Figure 22. Box and whisker plot for well yields by quadrangles within Custer and Pueblo Counties. Wetmore maximum yield is 379 gpm and Beulah maximum yield is 30 gpm.

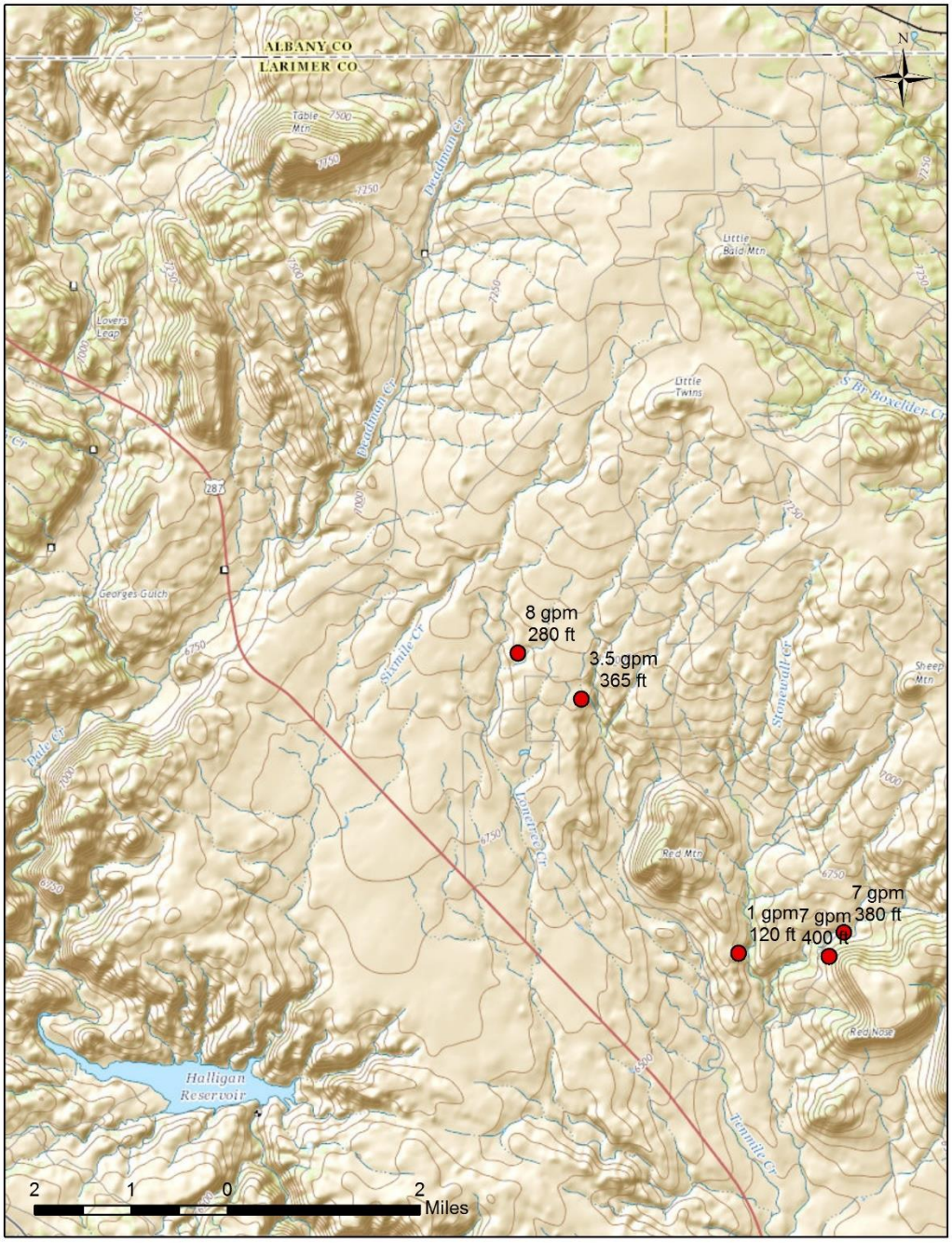


Figure 23. Fountain Formation well locations with yield and depth in the Table Mountain and Virginia Dale quadrangles.

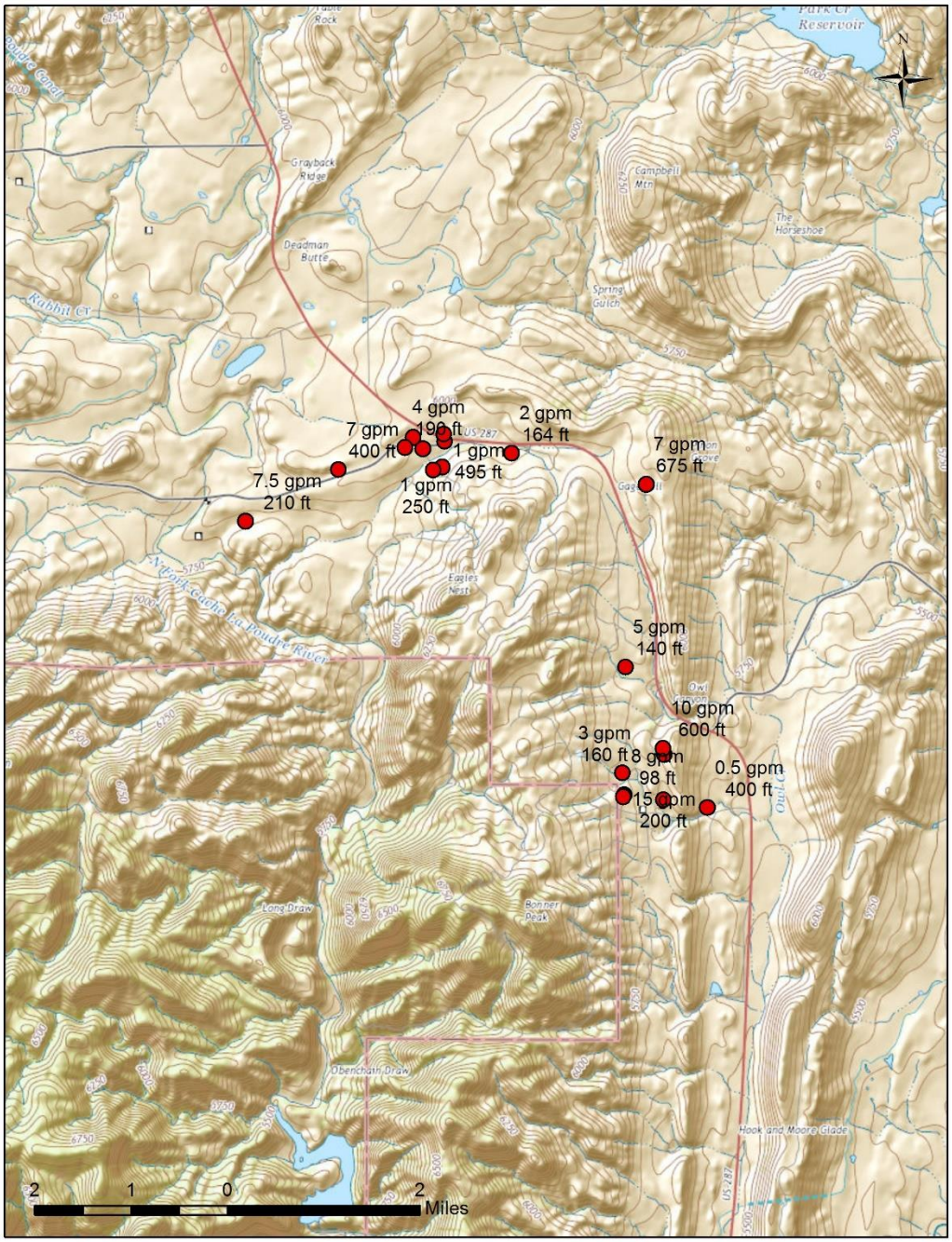


Figure 24. Fountain Formation well locations with yield and depth in the Livermore quadrangle. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

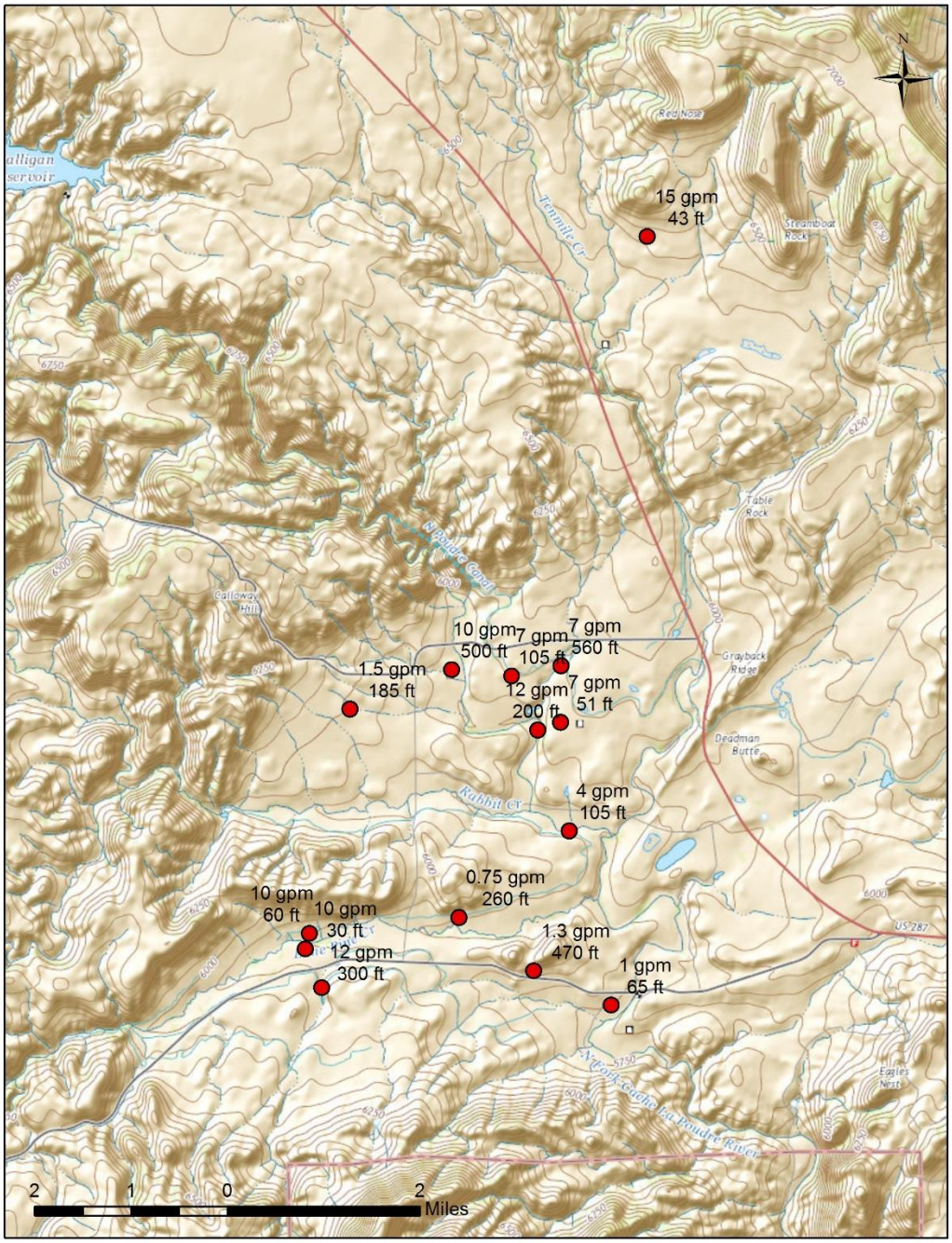


Figure 25. Fountain Formation well locations with yield and depth in the Livermore Mountain quadrangle.

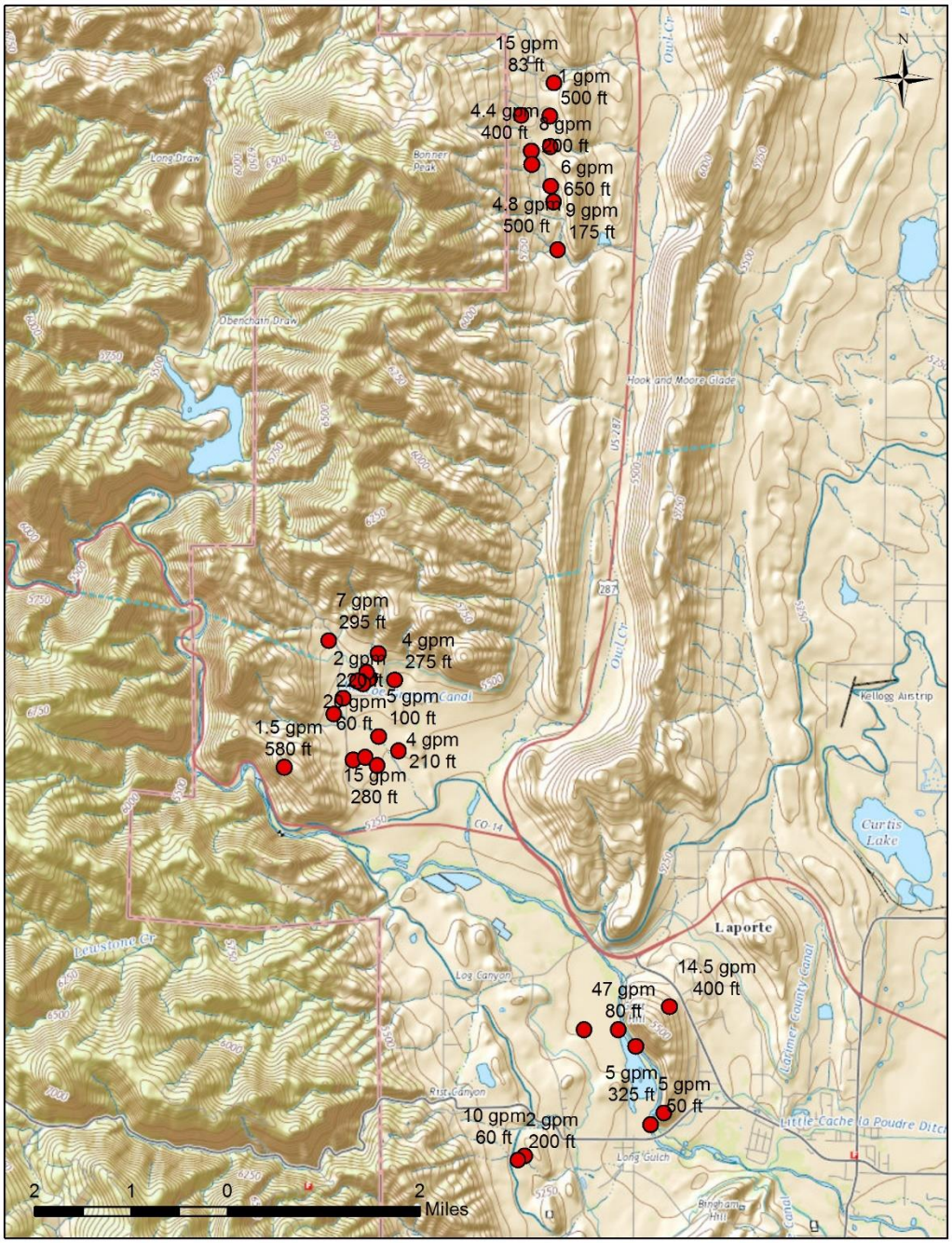


Figure 26. Fountain Formation well locations with yield and depth in the Laporte quadrangle. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

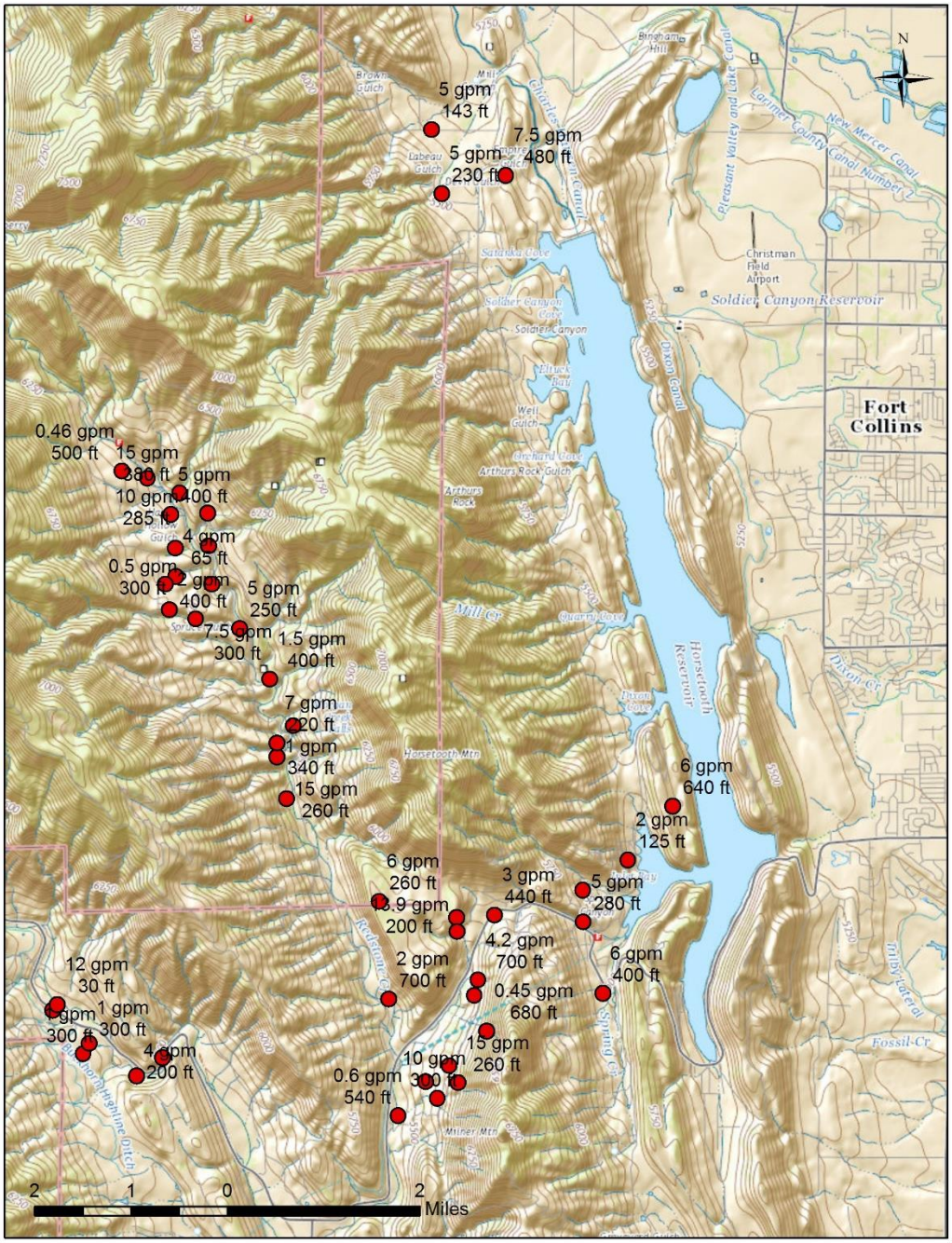


Figure 27. Fountain Formation well locations with yield and depth in the Horsetooth Reservoir quadrangle.

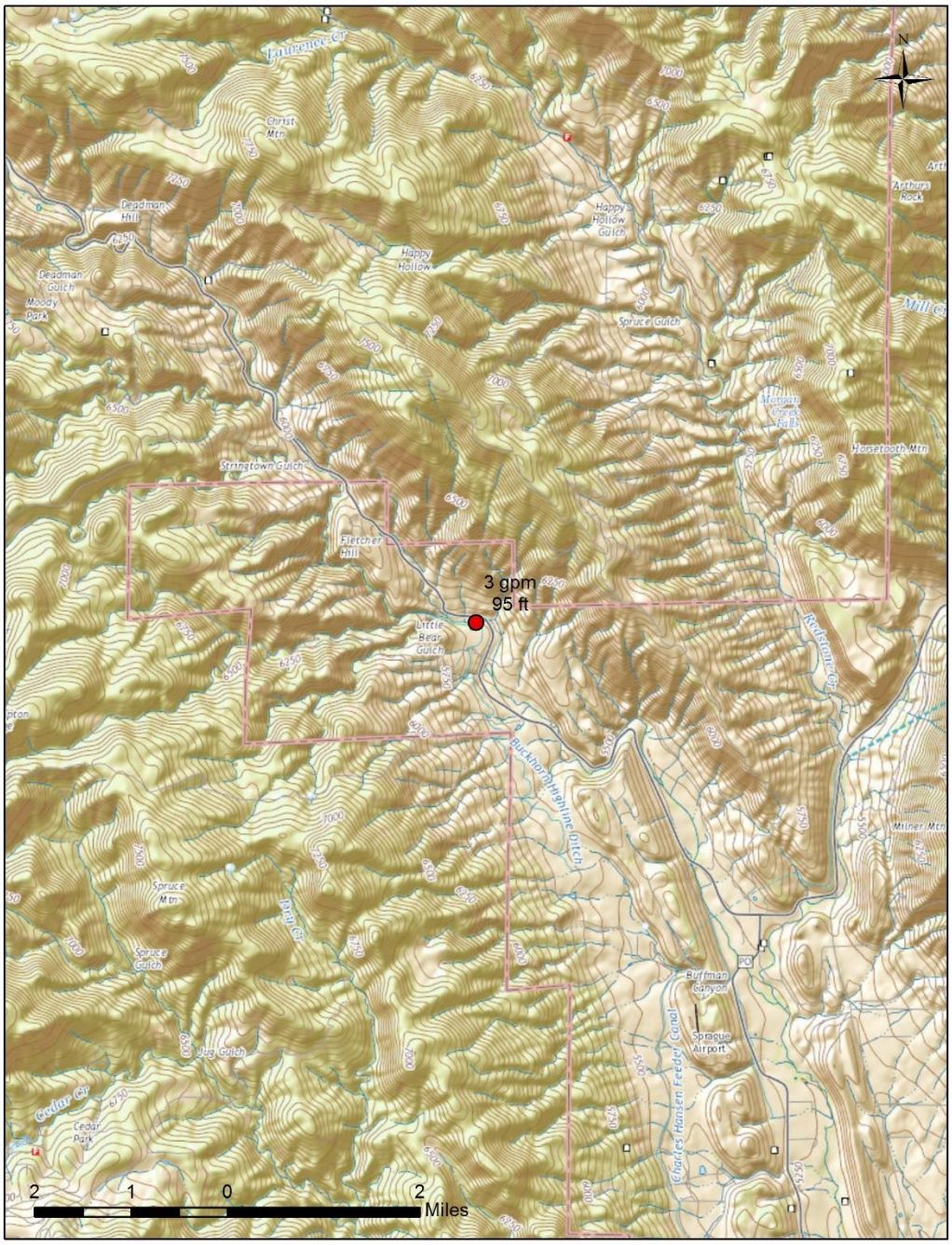


Figure 28. Fountain Formation well locations with yield and depth in the Buckhorn Mountain quadrangle.

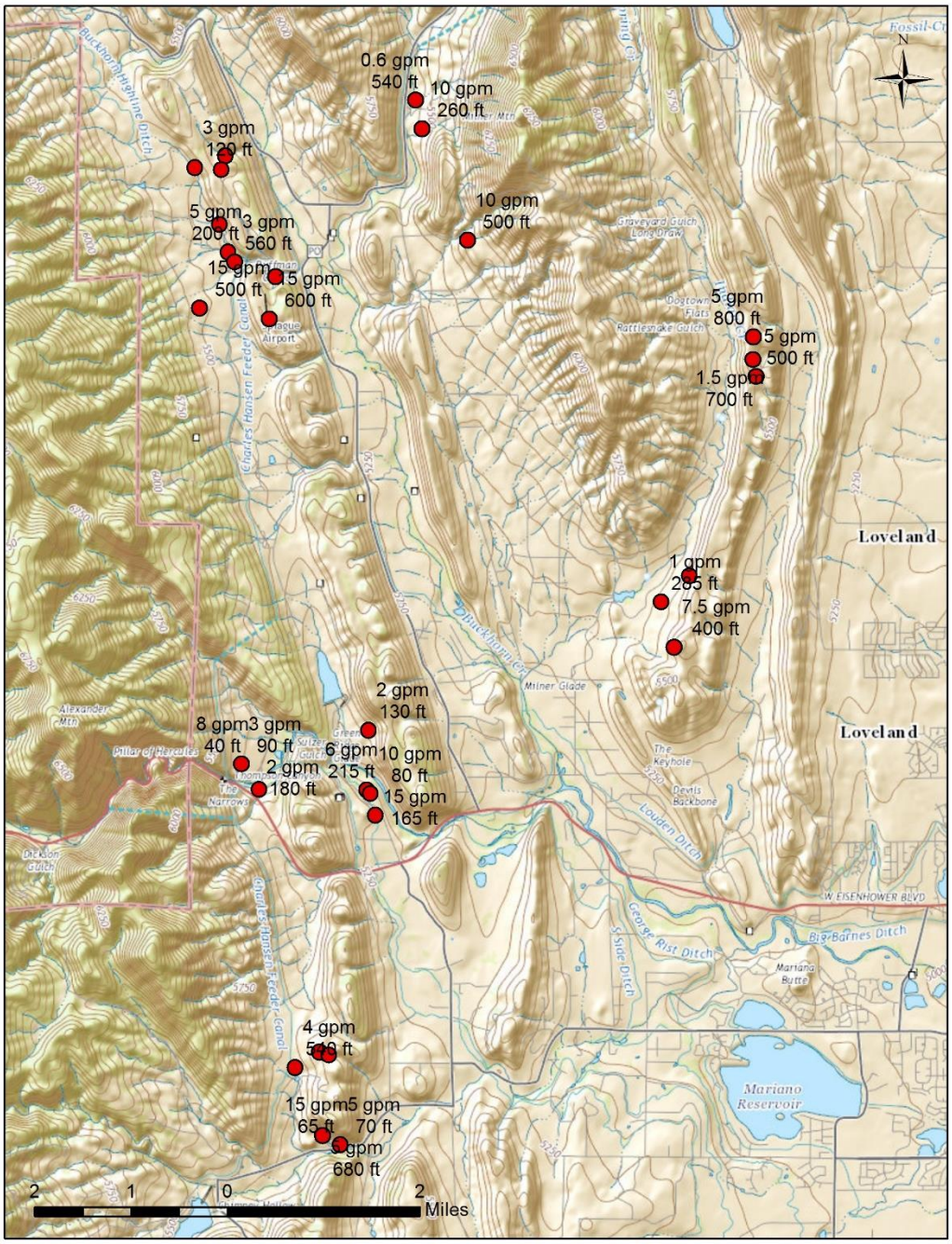


Figure 29. Fountain Formation well locations with yield and depth in the Masonville quadrangle.

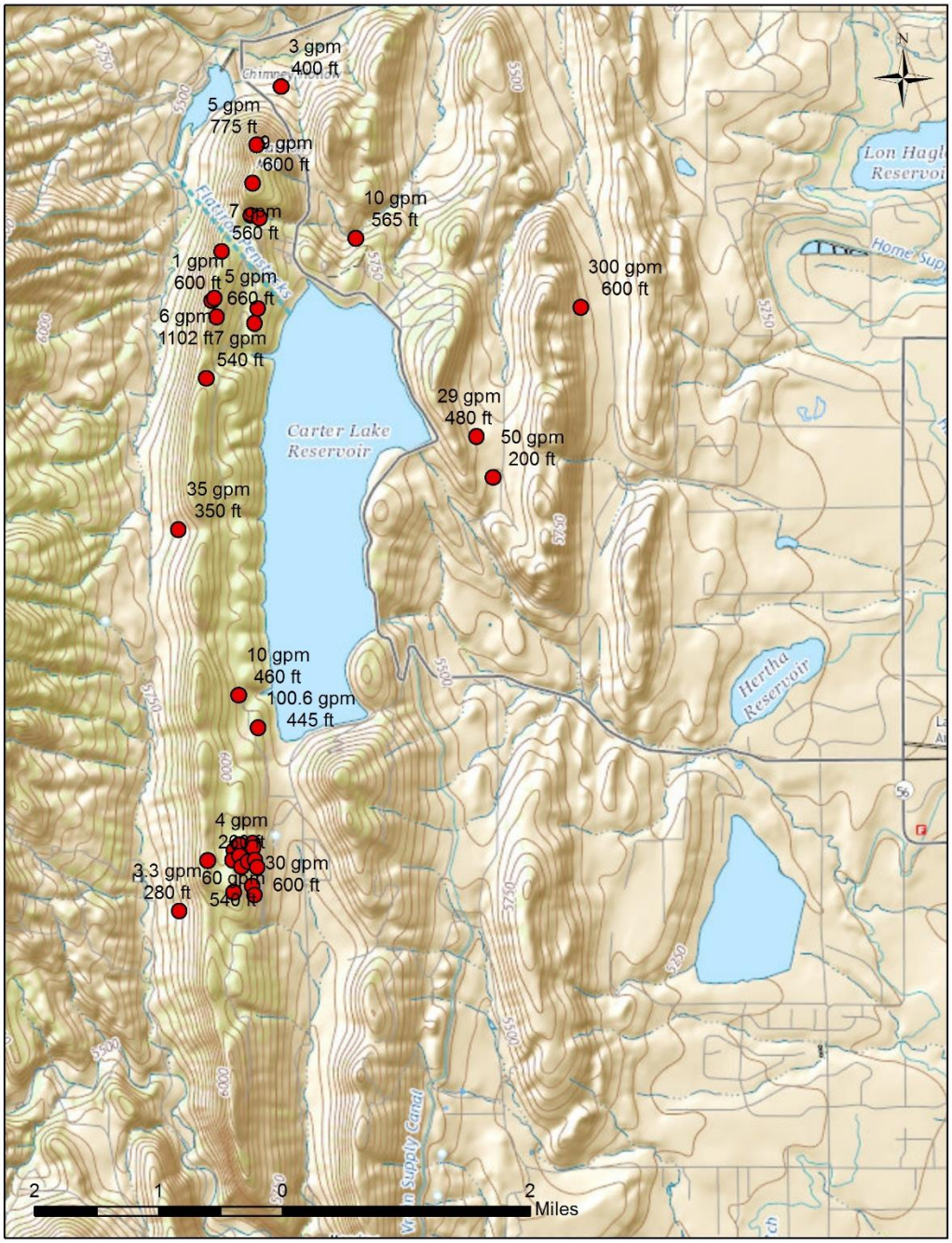


Figure 30. Fountain Formation well locations with yield and depth in the Carter Lake quadrangle. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

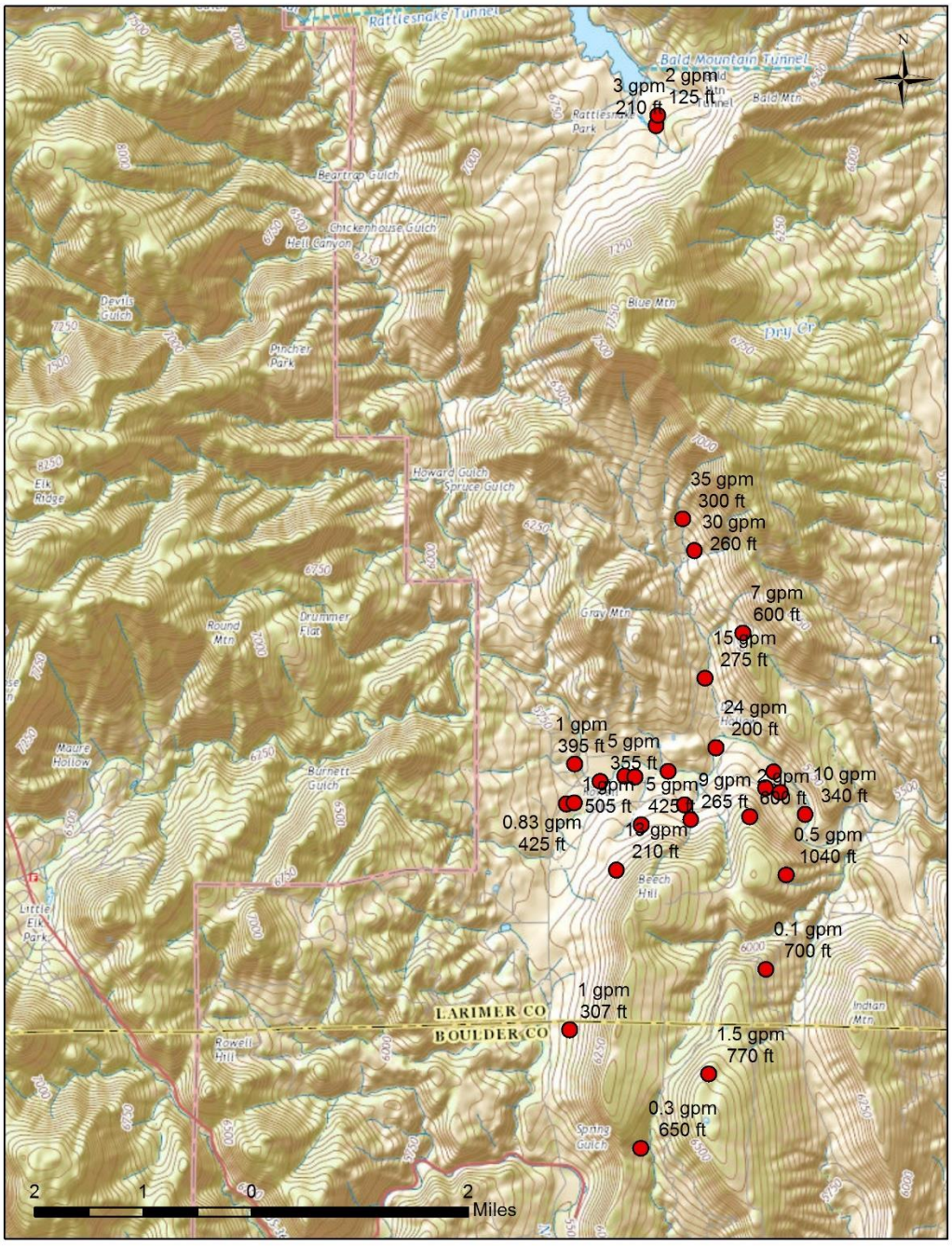


Figure 31. Fountain Formation well locations with yield and depth in the Pinewood Lake quadrangle.

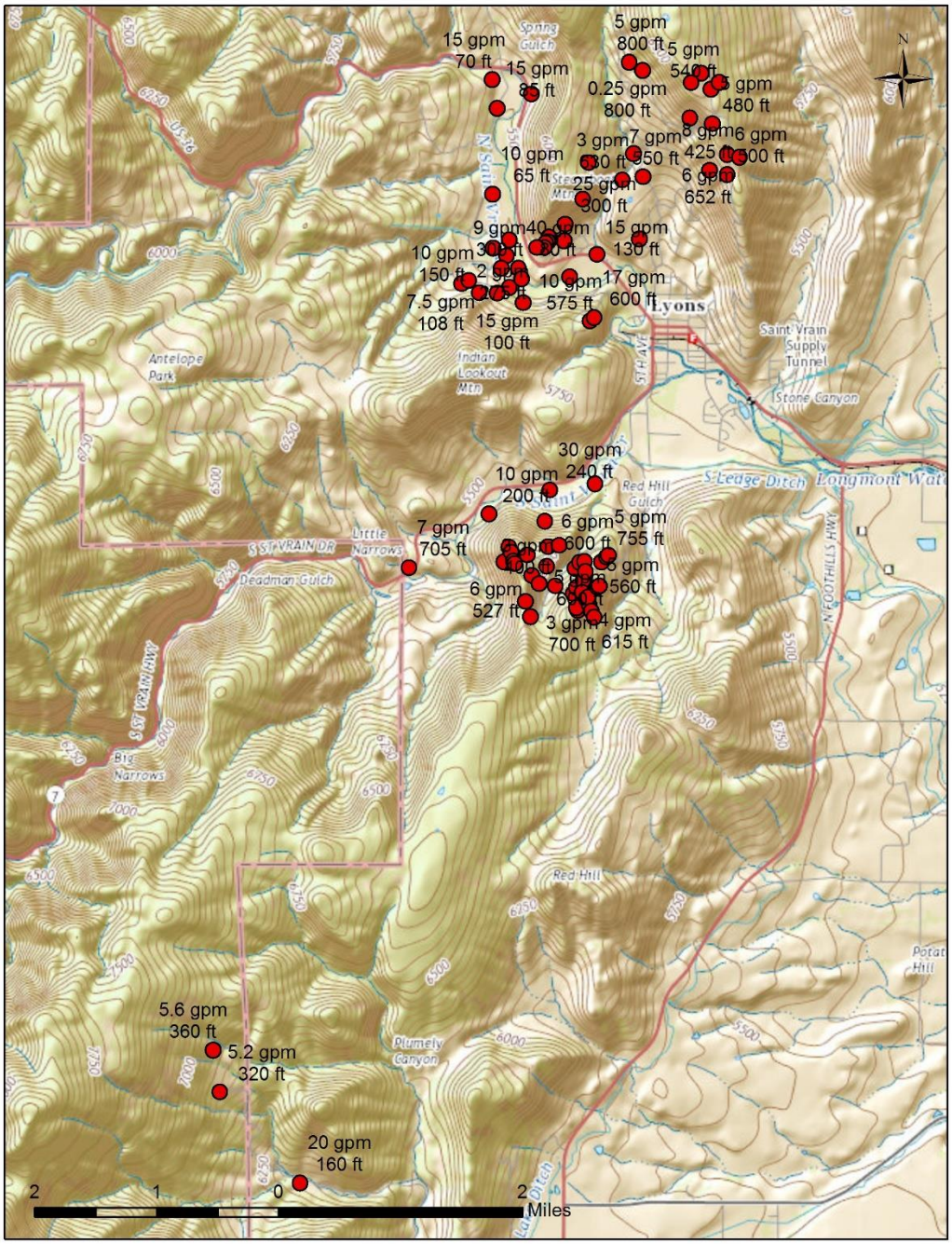


Figure 32. Fountain Formation well locations with yield and depth in the Lyons quadrangle. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

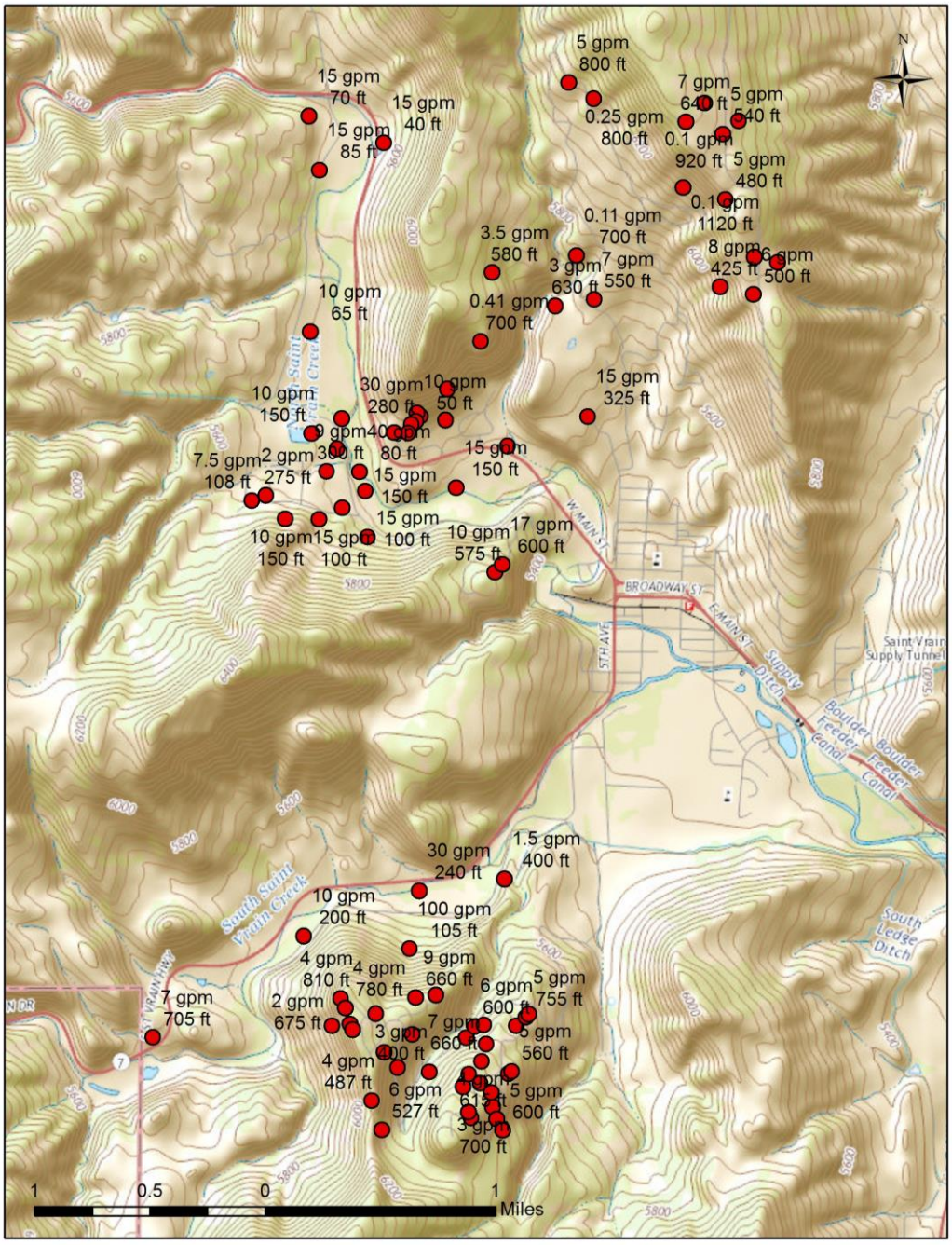


Figure 33. Fountain Formation well locations with yield and depth in the Lyons quadrangle with a larger scale view. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

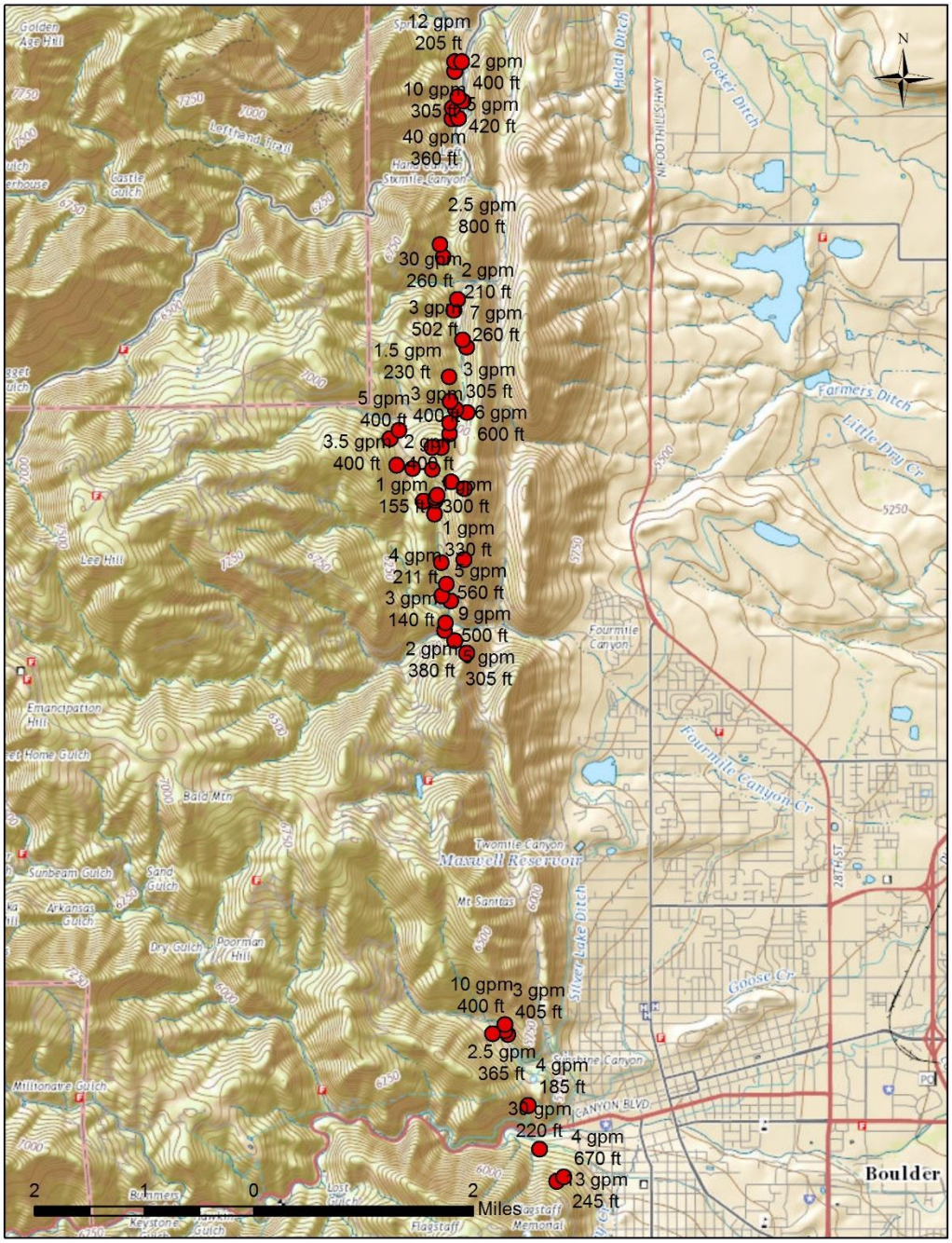


Figure 34. Fountain Formation well locations with yield and depth in the Boulder quadrangle.

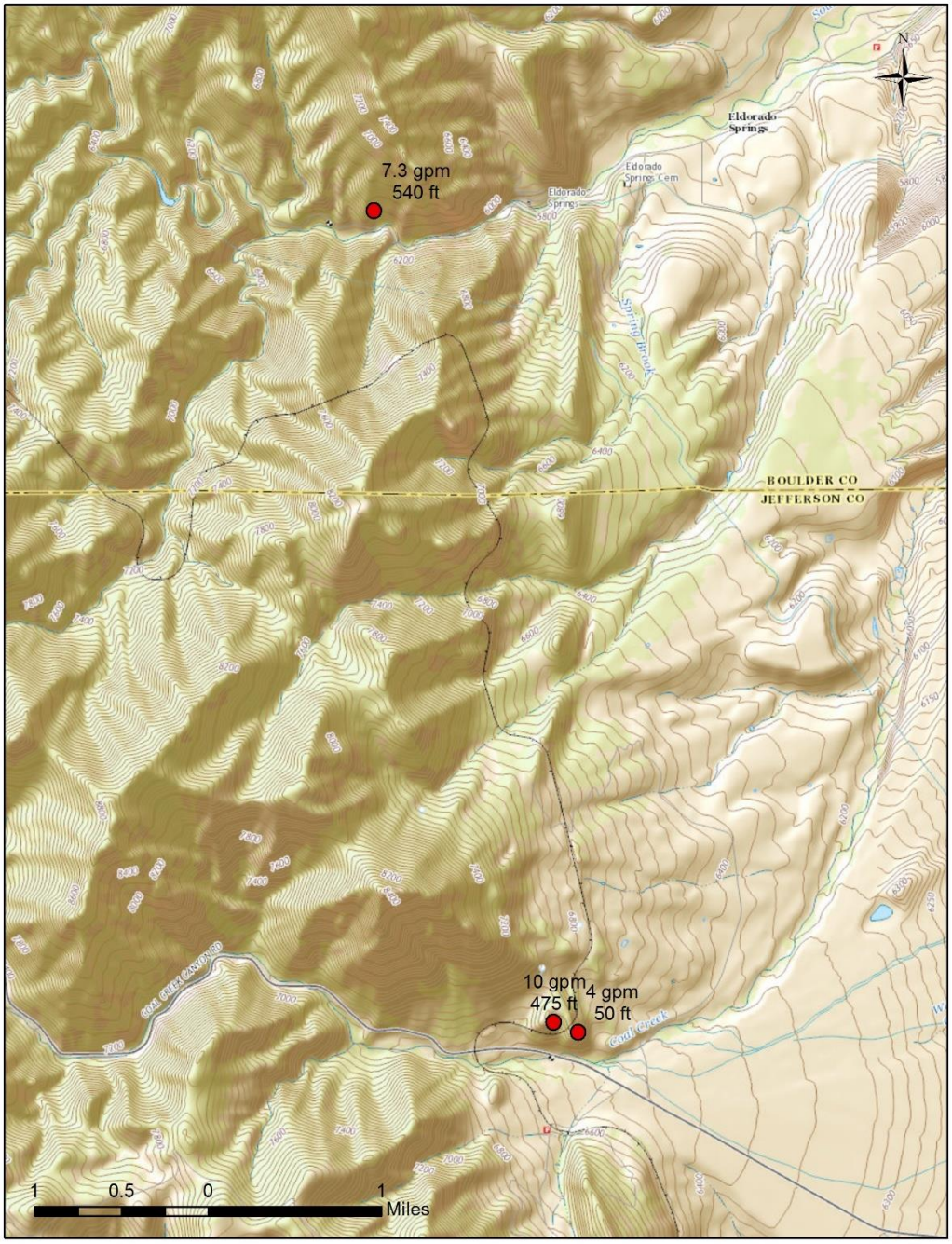


Figure 35. Fountain Formation well locations with yield and depth in the Eldorado Springs quadrangle.

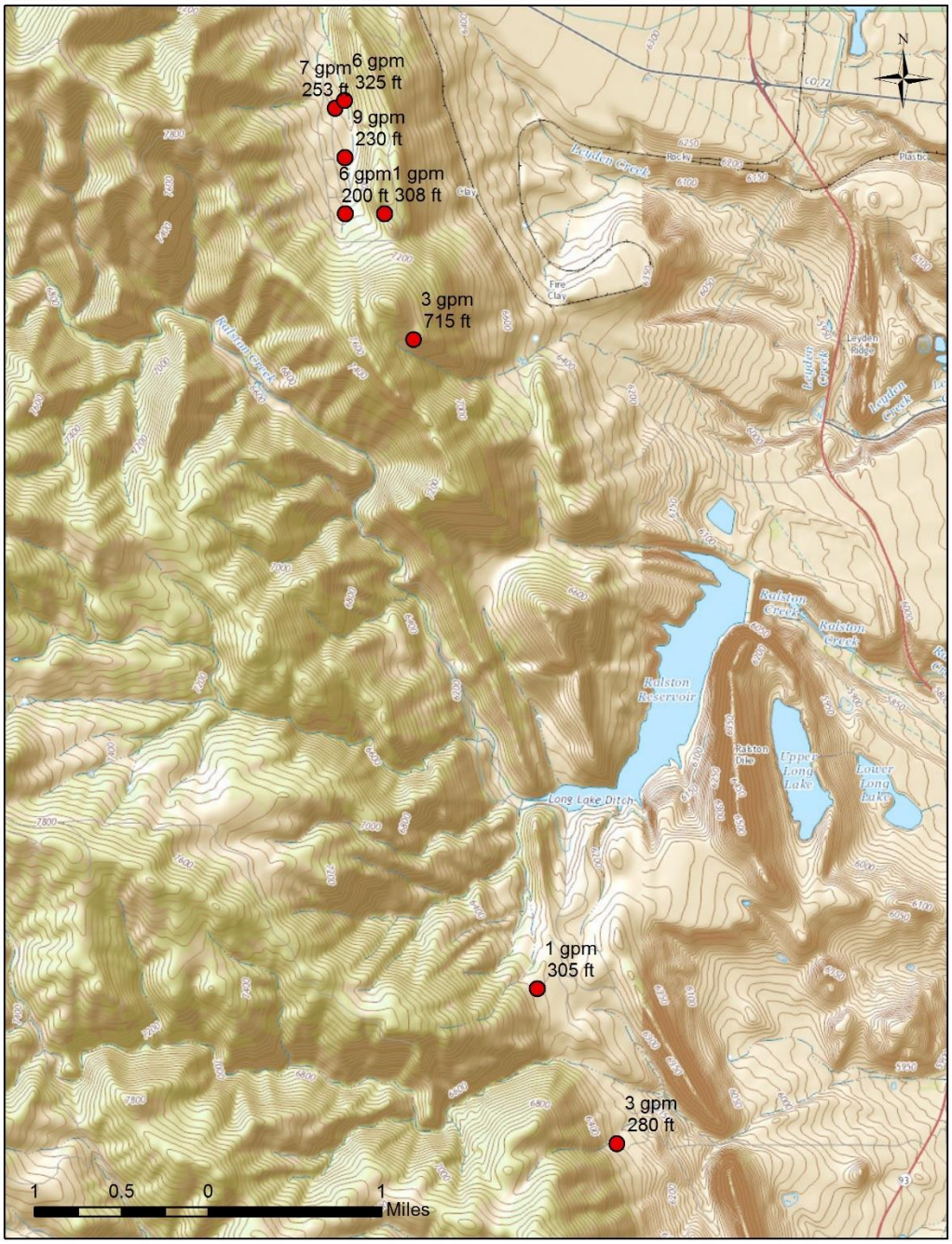


Figure 36. Fountain Formation well locations with yield and depth in the Ralston Buttes quadrangle.

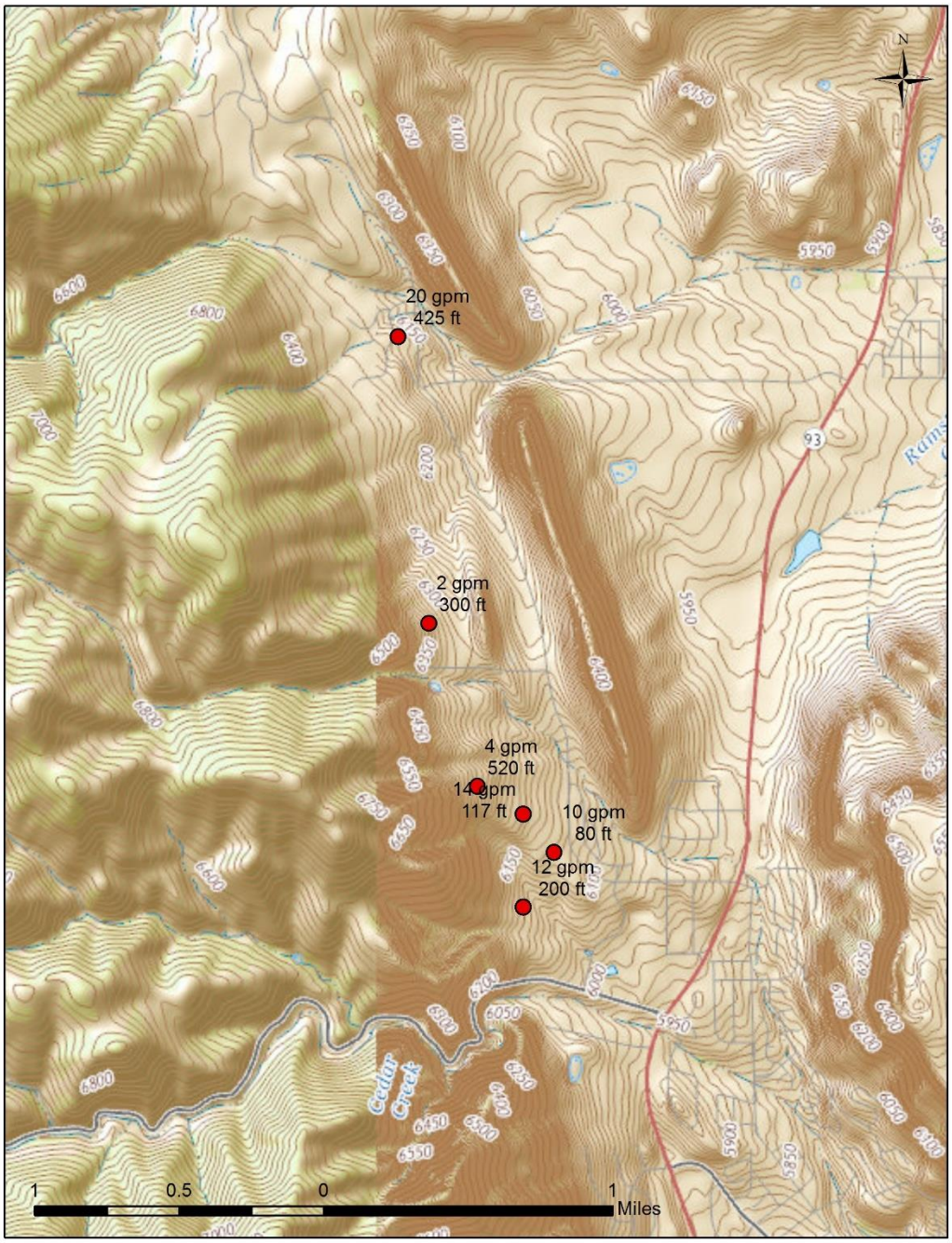


Figure 37. Fountain Formation well locations with yield and depth in the Golden quadrangle.

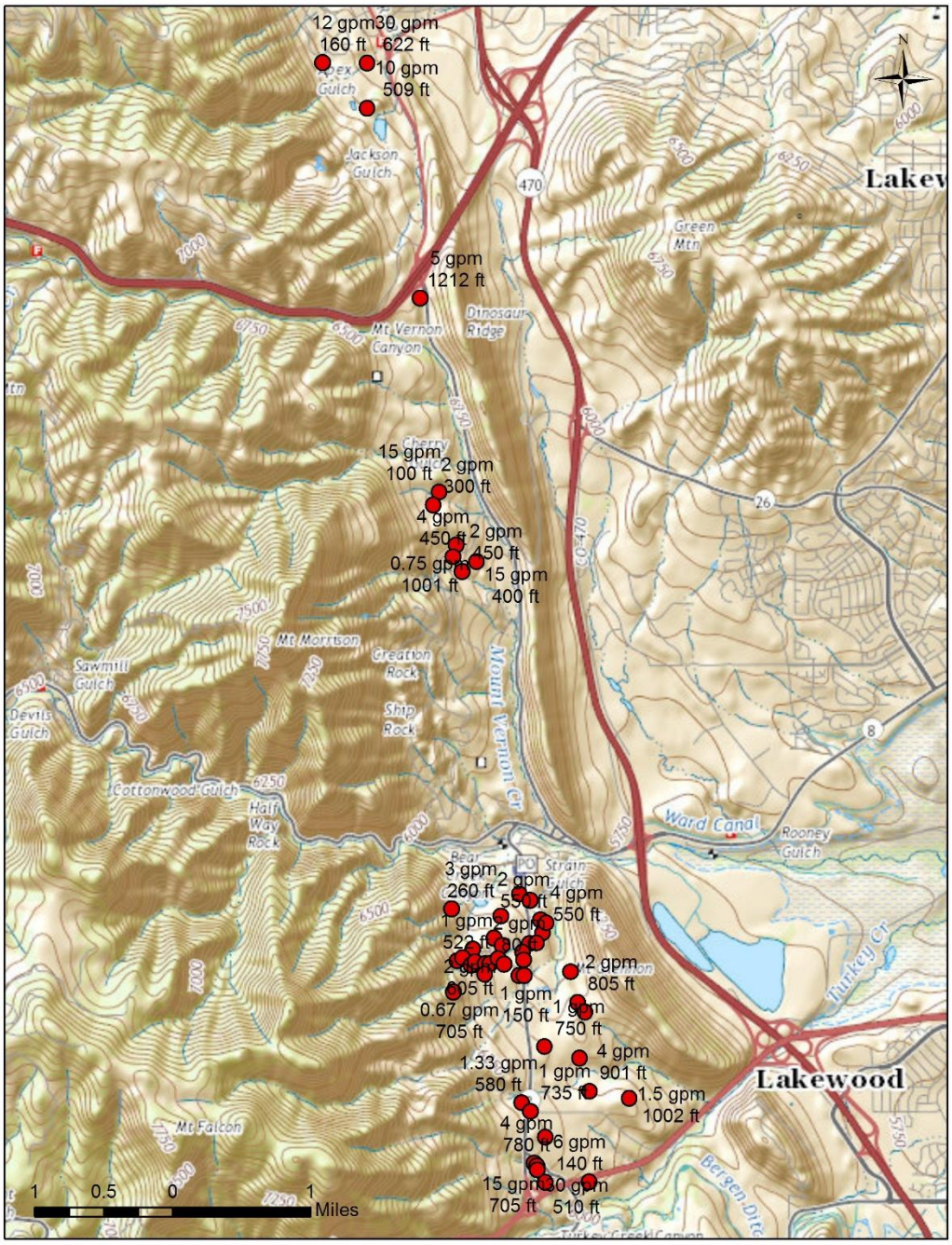


Figure 38. Fountain Formation well locations with yield and depth in the Morrison quadrangle. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

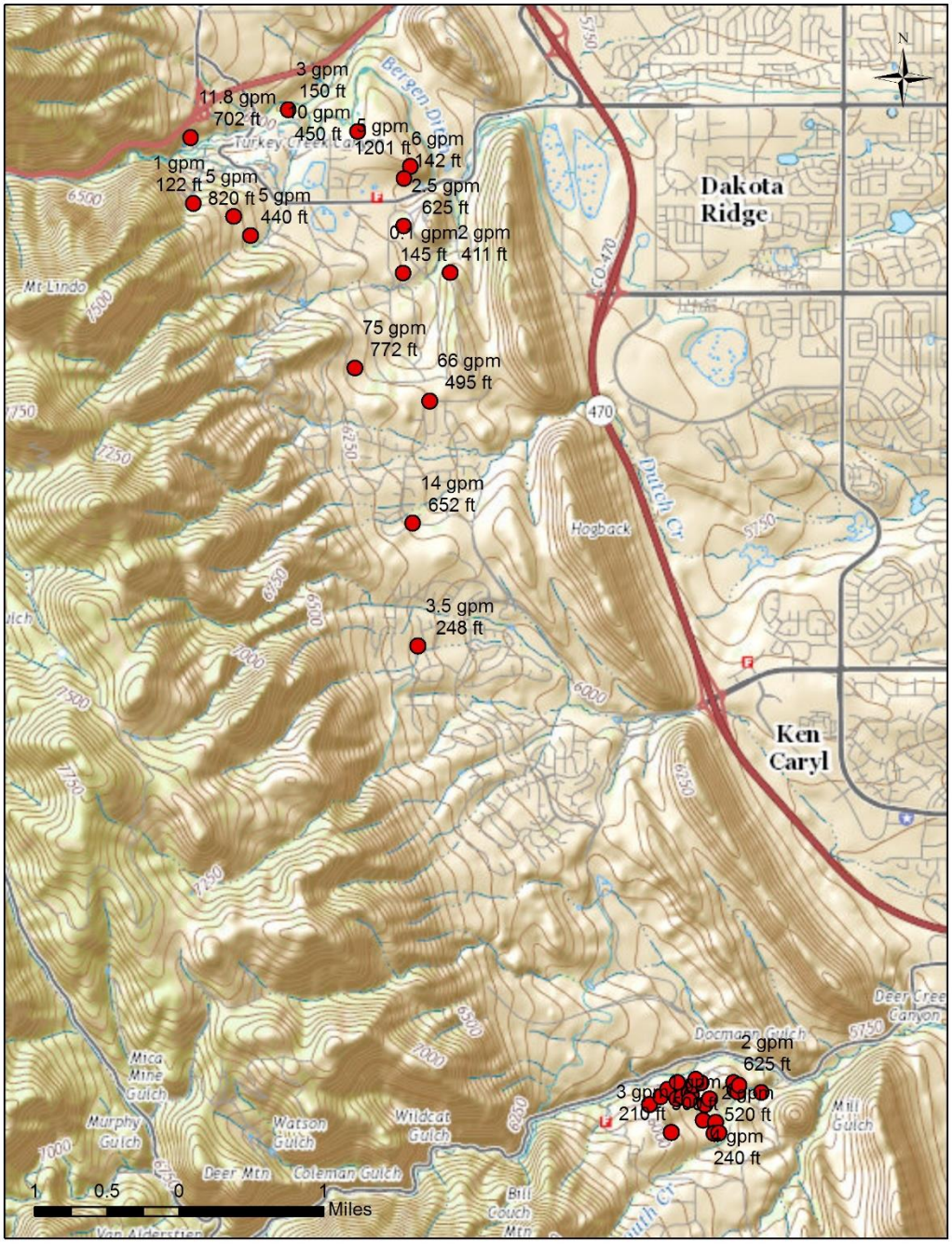


Figure 39. Fountain Formation well locations with yield and depth in the Indian Hills quadrangle. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

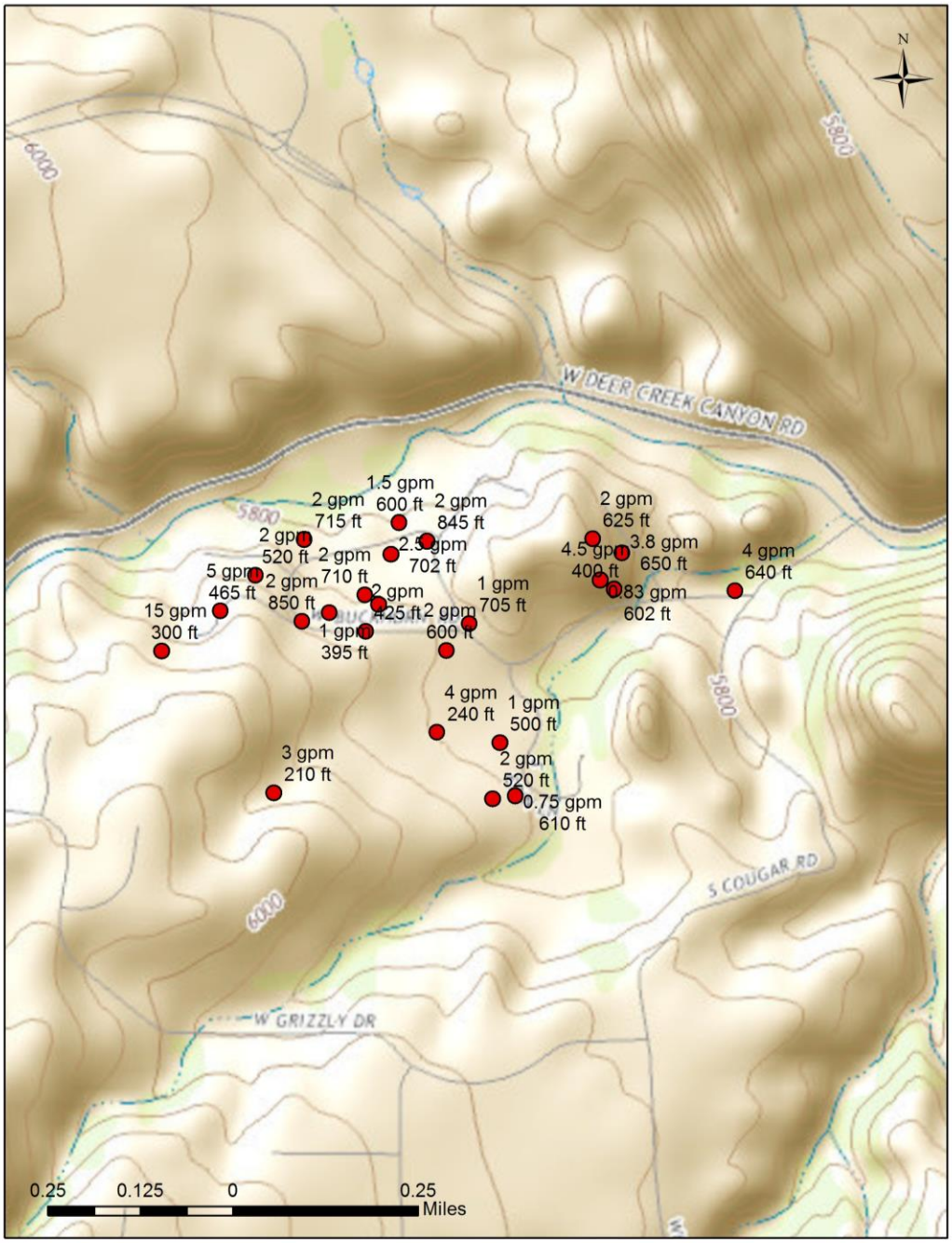


Figure 40. Fountain Formation well locations with yield and depth in the Indian Hills quadrangle with a larger scale view.

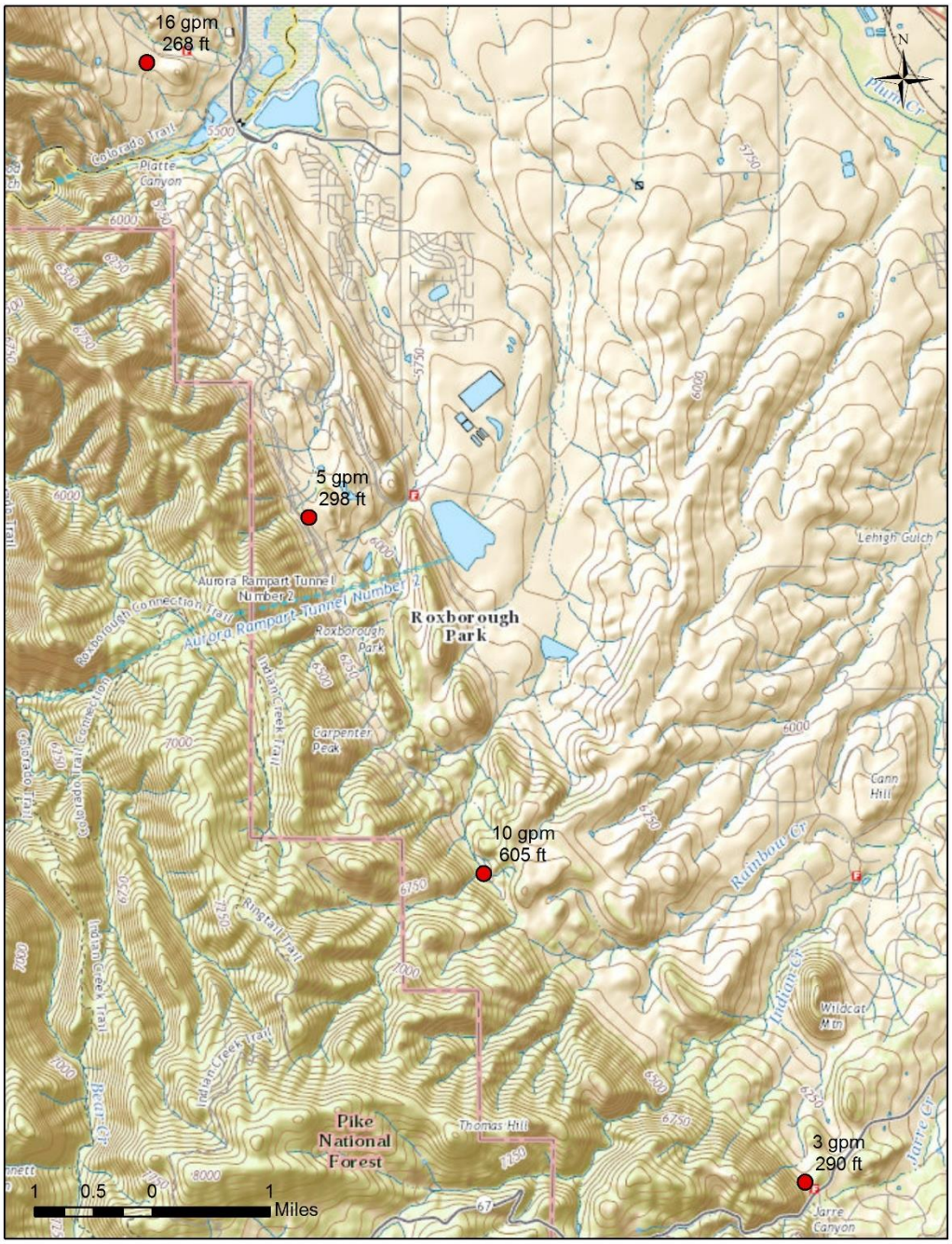


Figure 41. Fountain Formation well locations with yield and depth in the Kassler quadrangle.

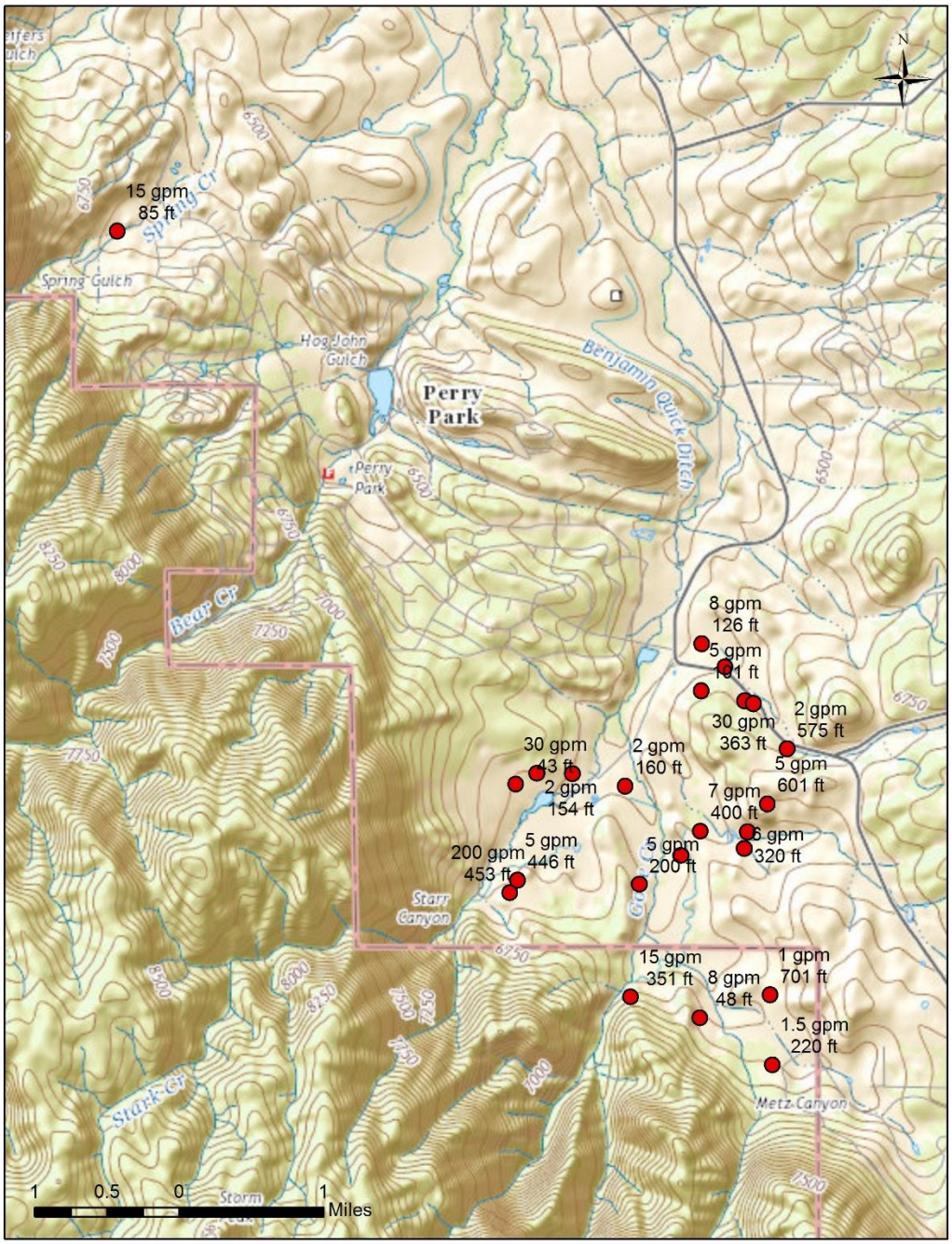


Figure 42. Fountain Formation well locations with yield and depth in the Dawson Butte and Larkspur quadrangles.

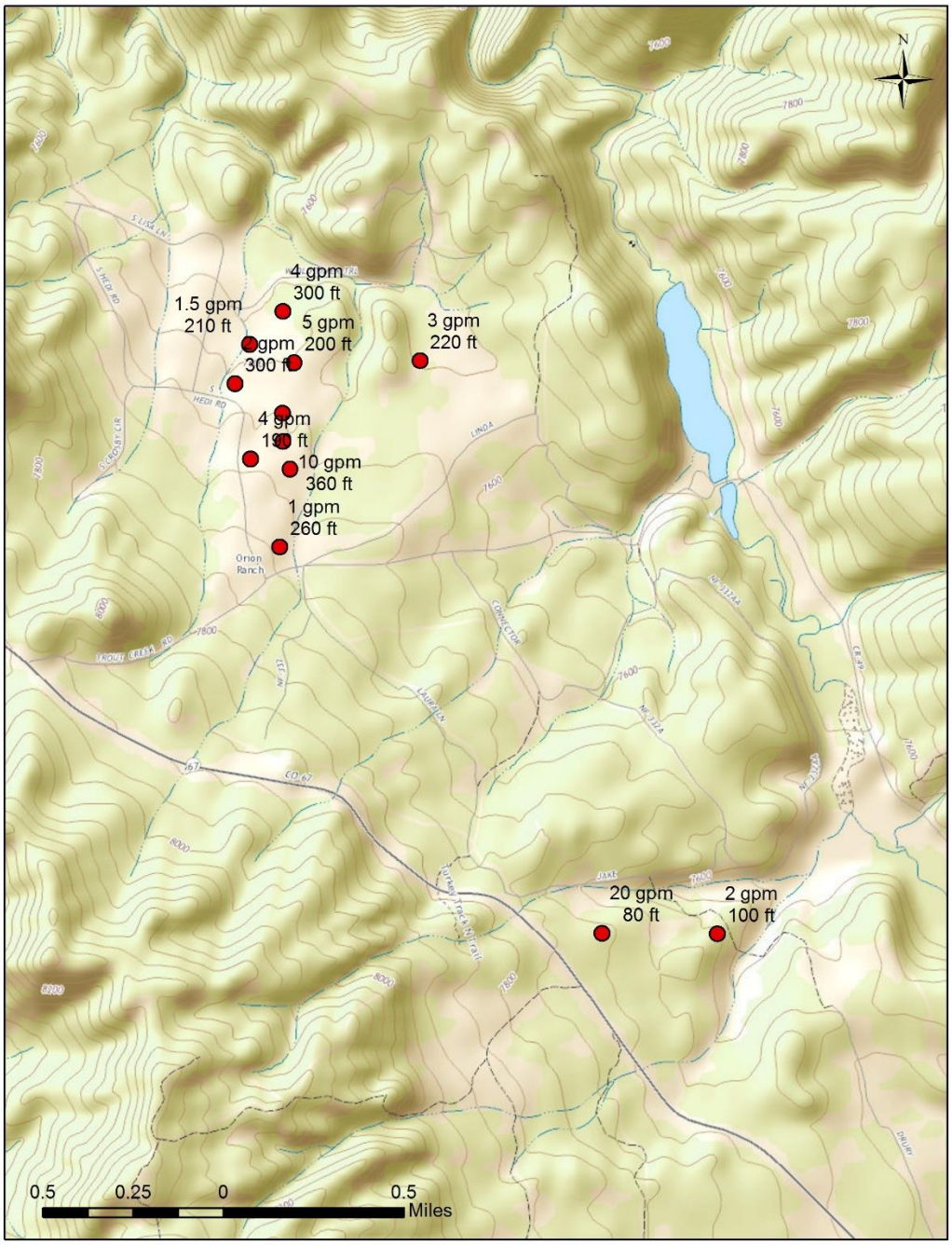


Figure 43. Fountain Formation well locations with yield and depth in the Dakan Mountain quadrangle.

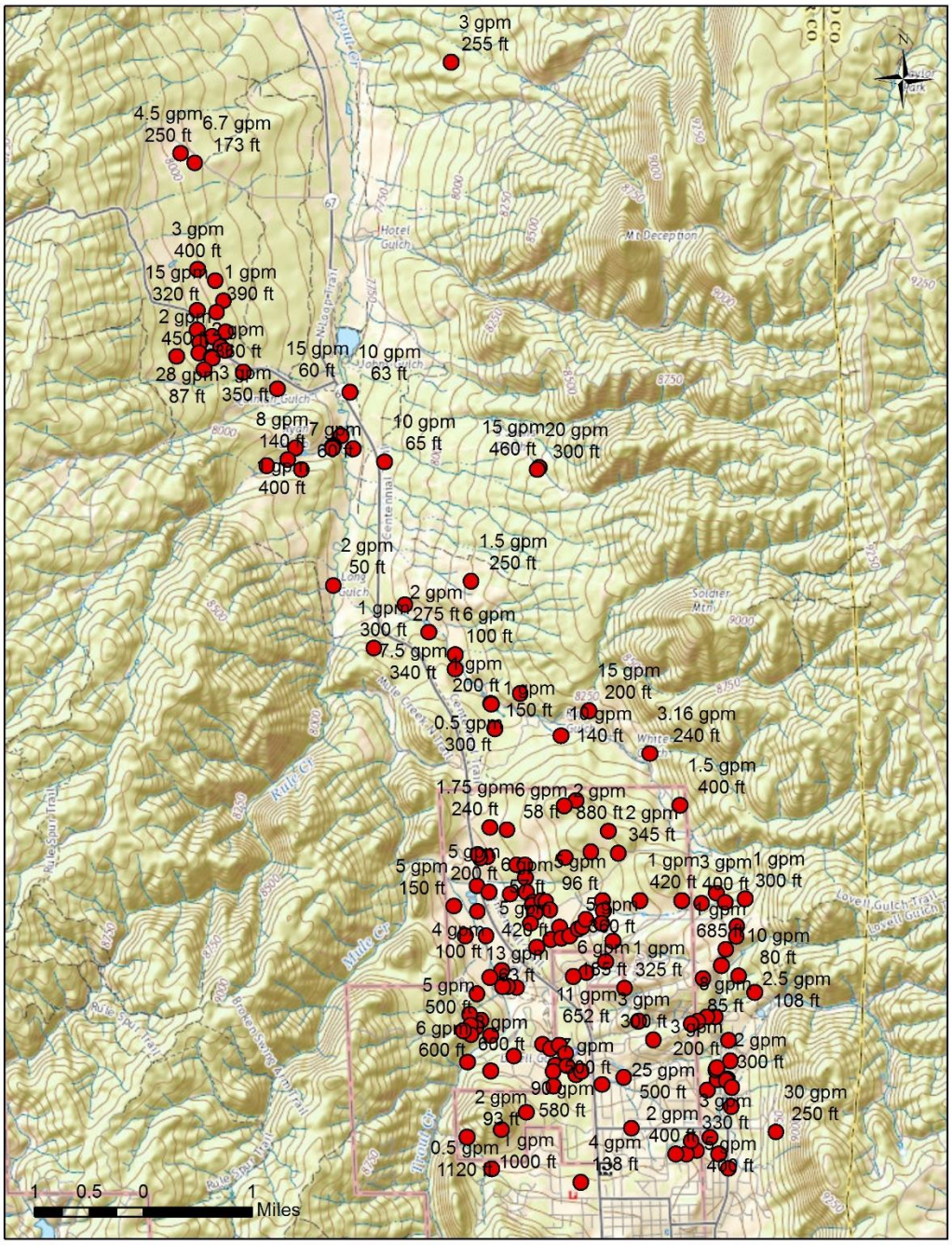


Figure 44. Fountain Formation well locations with yield and depth in the Mount Deception quadrangle. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

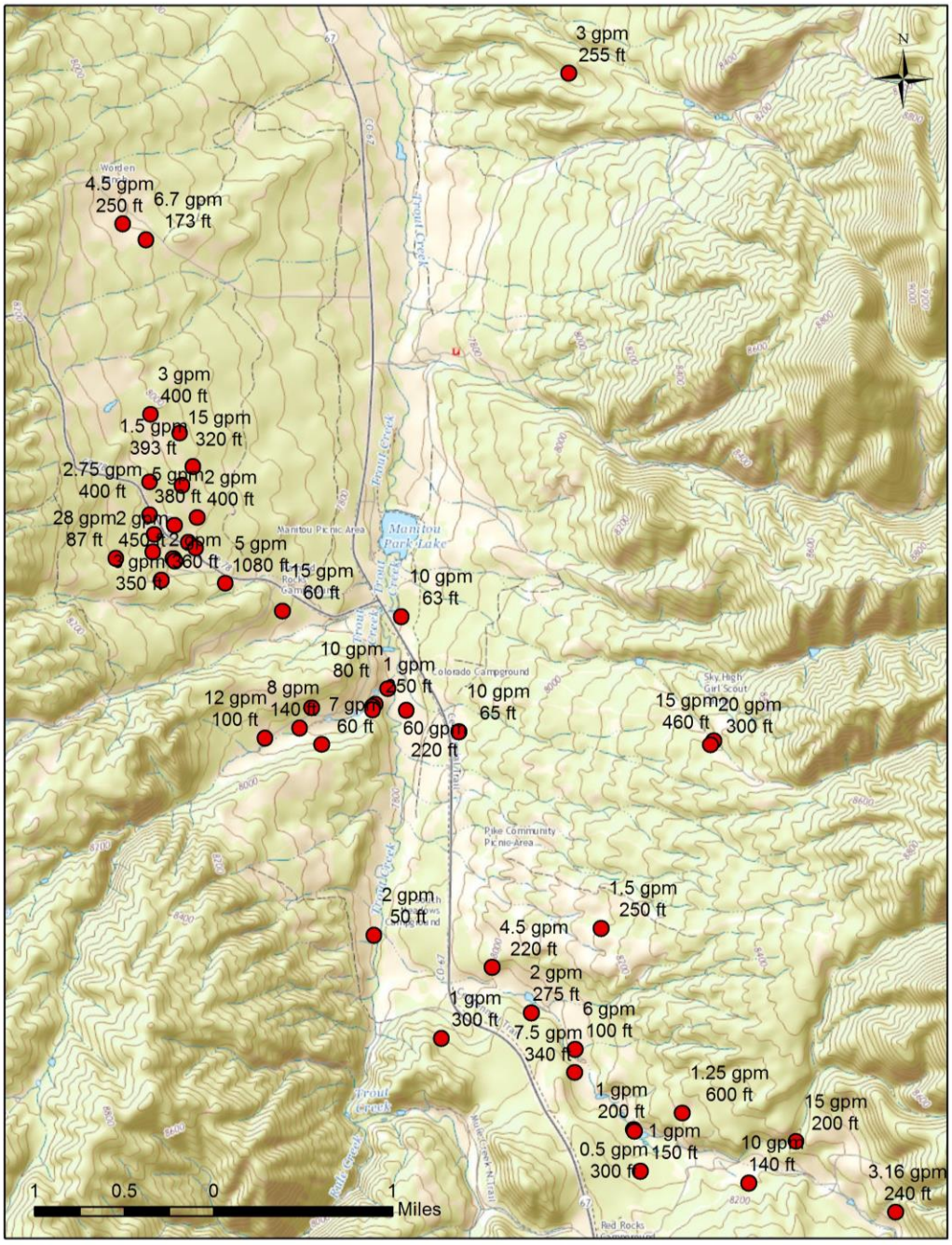


Figure 45. Fountain Formation well locations with yield and depth in the Mount Deception quadrangle with a larger scale view.

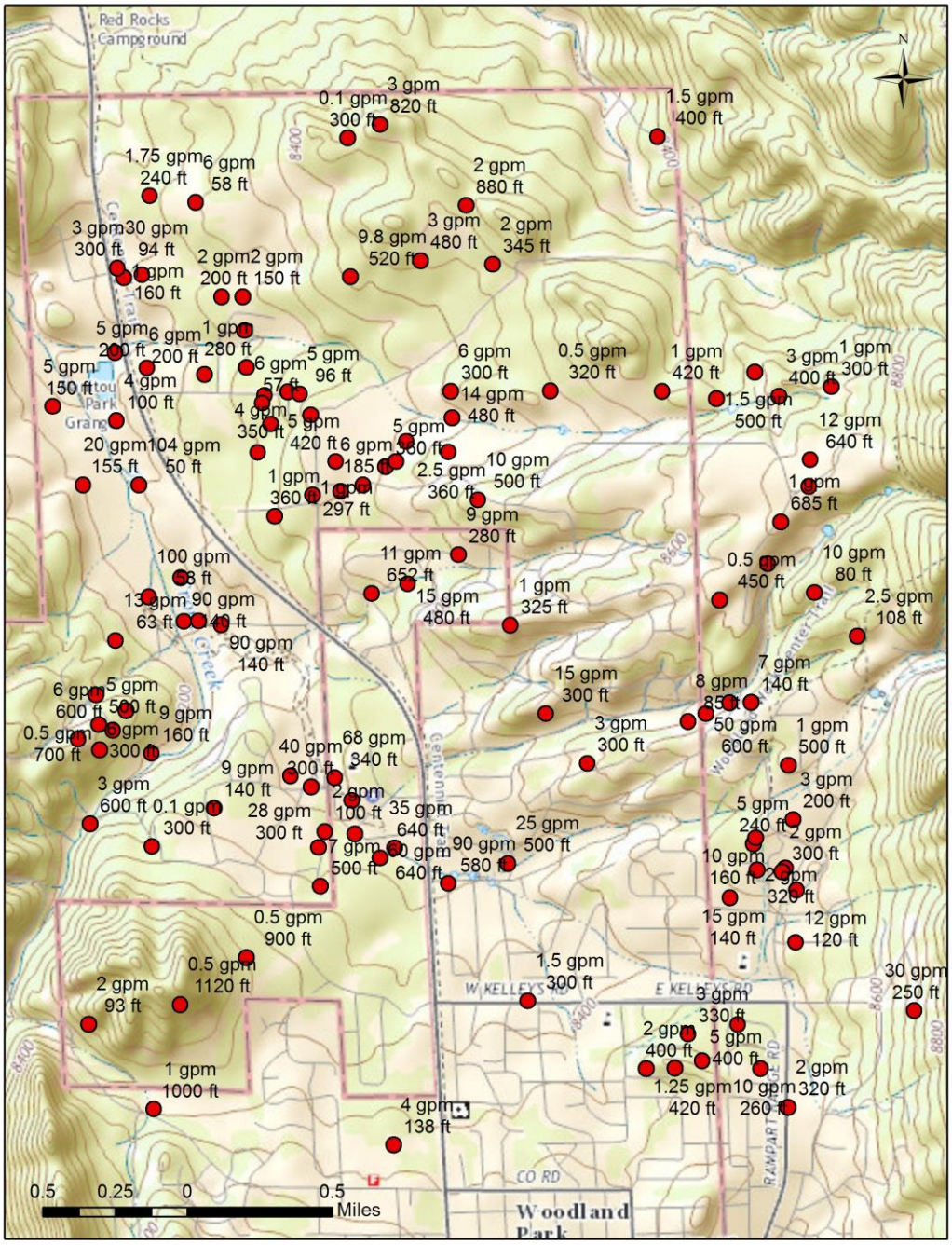


Figure 46. A second map of Fountain Formation well locations with yield and depth in the Mount Deception quadrangle with a larger scale view.

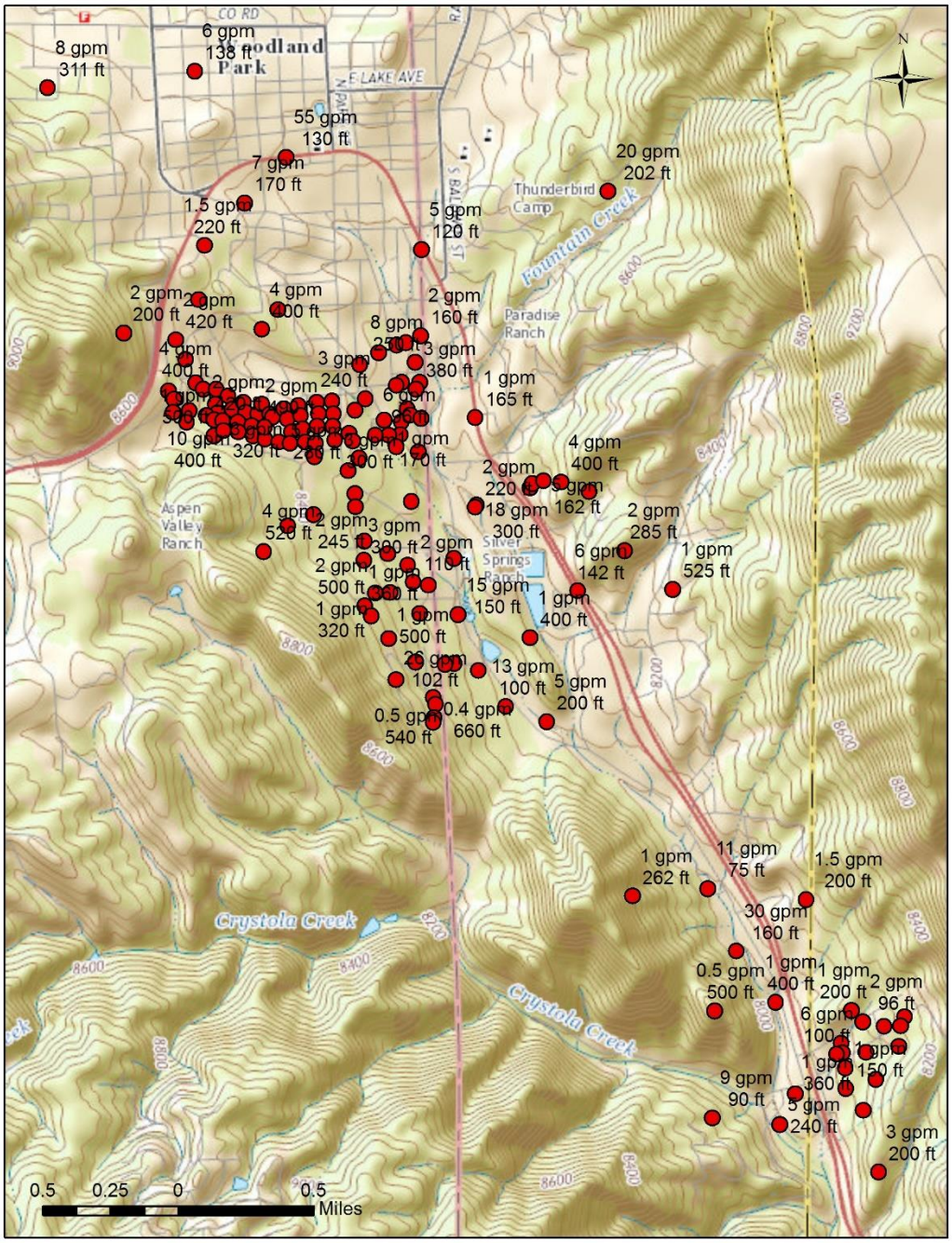


Figure 47. Fountain Formation well locations with yield and depth in the Woodland Park quadrangle. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

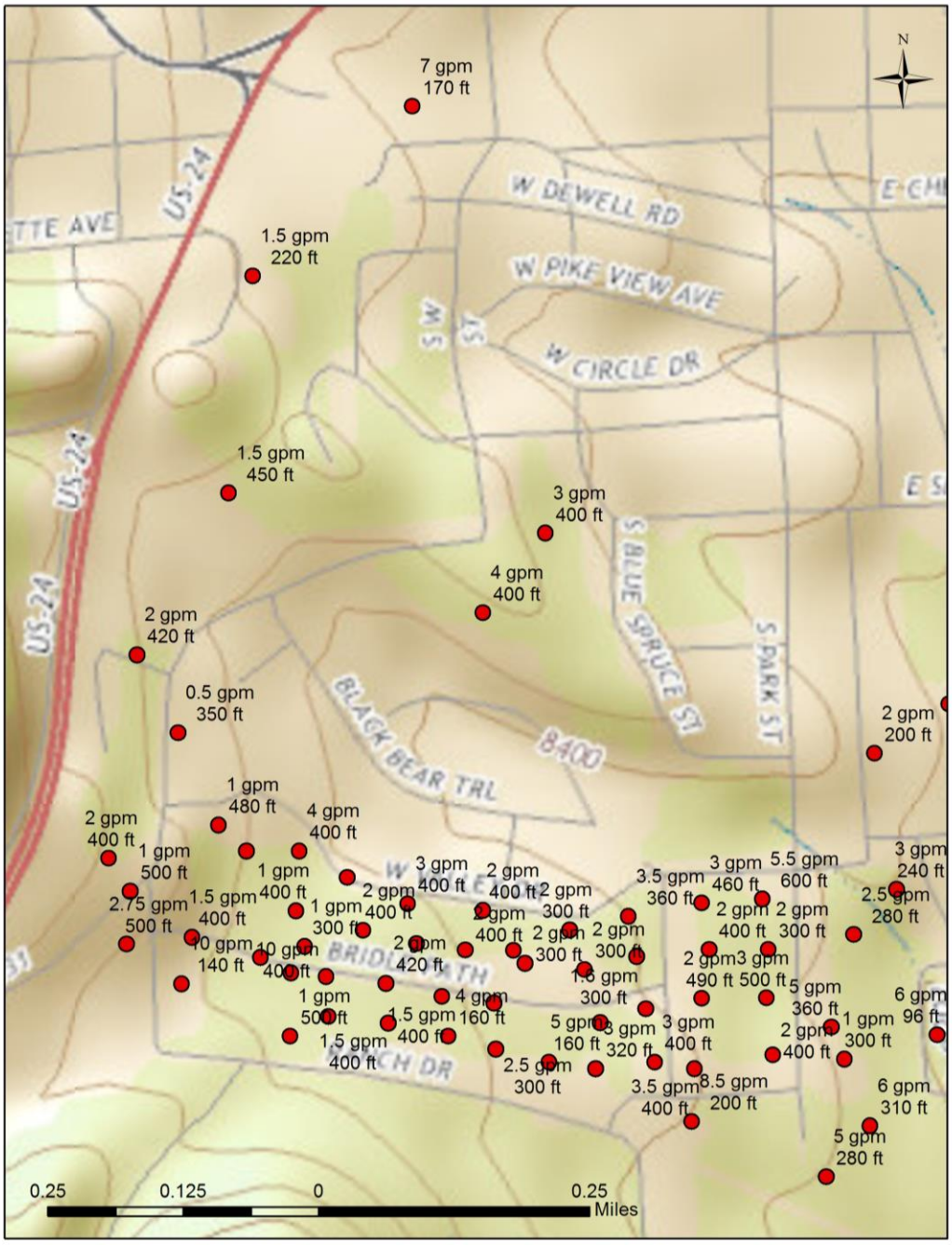


Figure 48. Fountain Formation well locations with yield and depth in the Woodland Park quadrangle with a larger scale view.

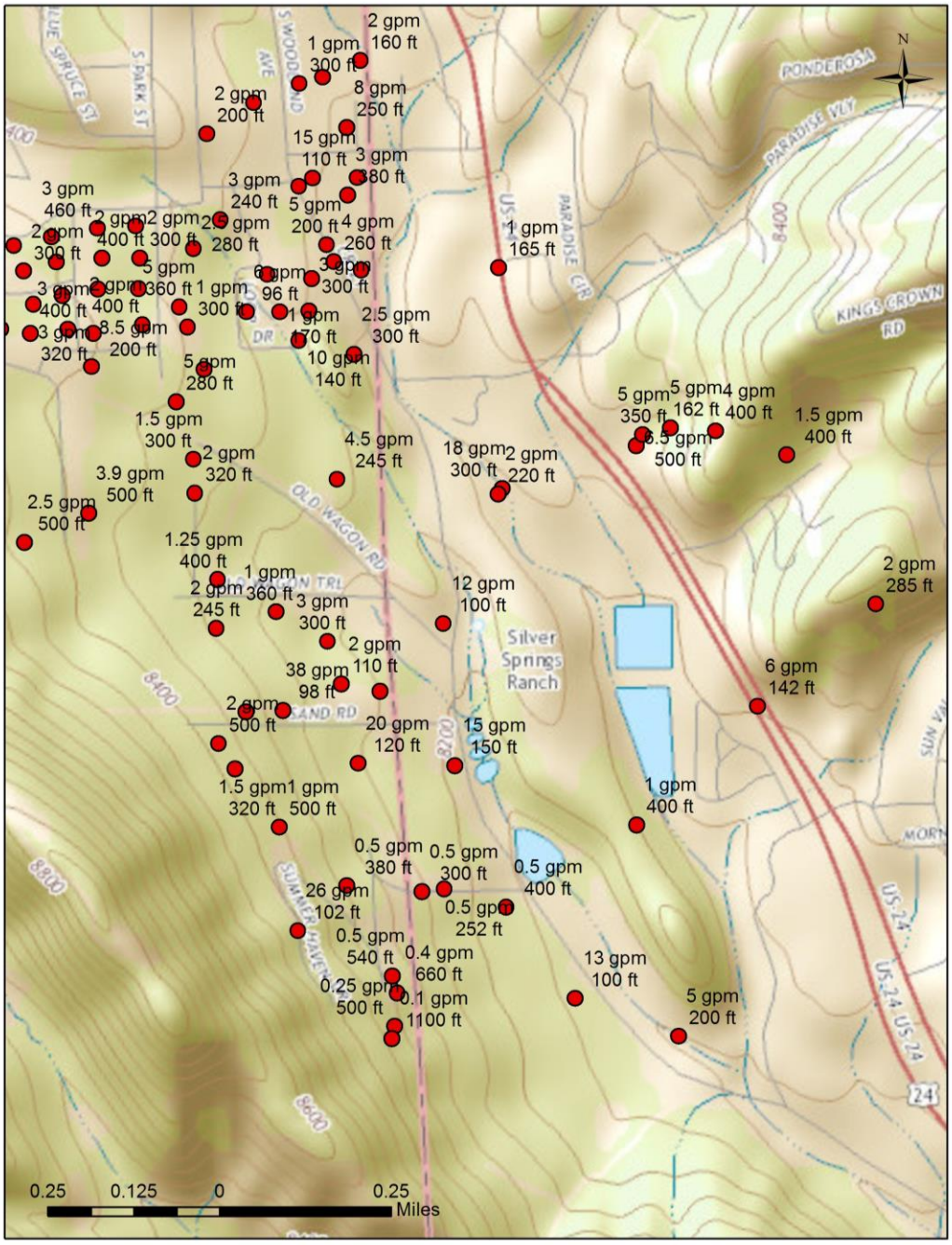


Figure 49. A second map of Fountain Formation well locations with yield and depth in the Woodland Park quadrangle with a larger scale view.

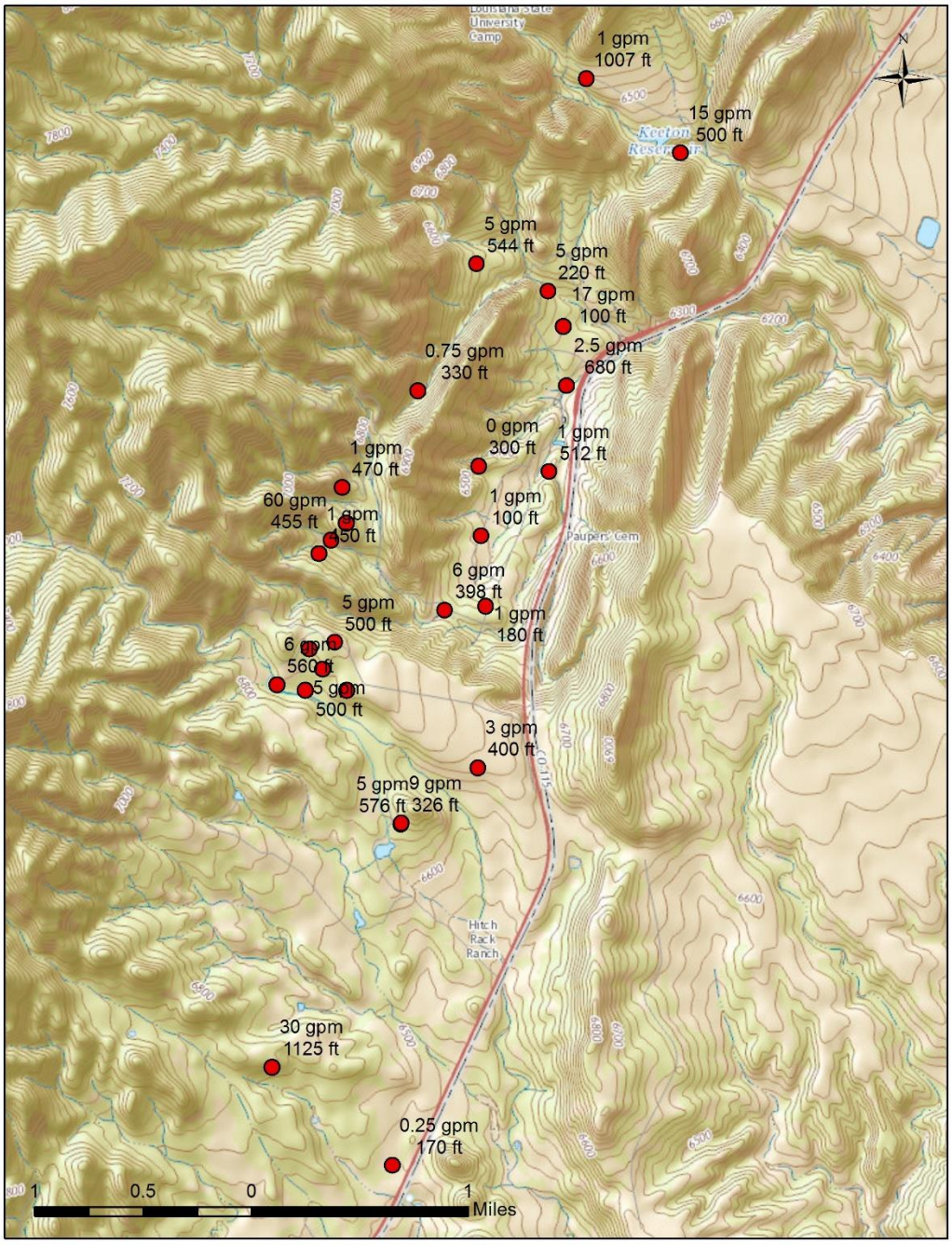


Figure 50. Fountain Formation well locations with yield and depth in the Cheyenne Mountain quadrangle.

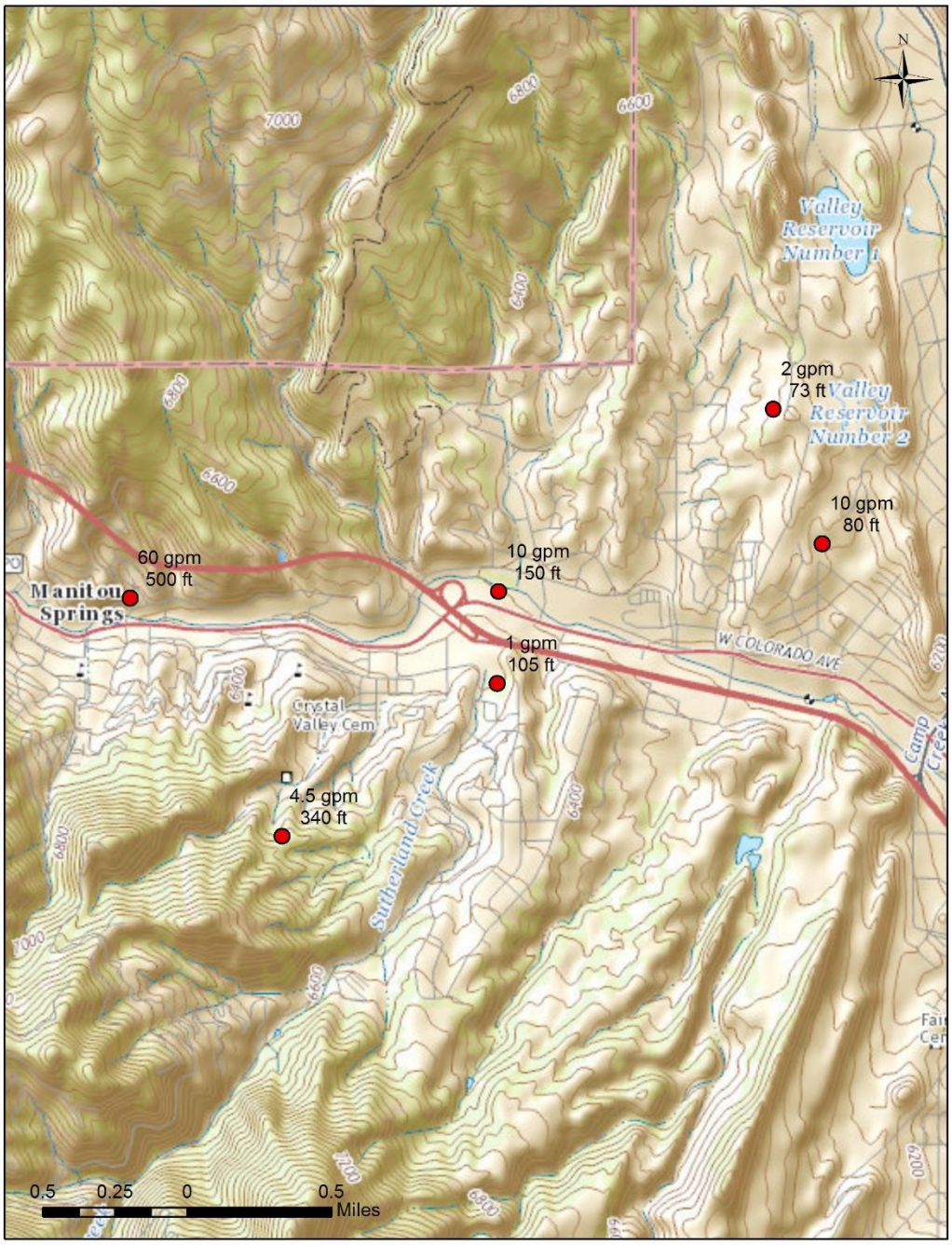


Figure 51. Fountain Formation well locations with yield and depth in the Manitou Springs quadrangle.

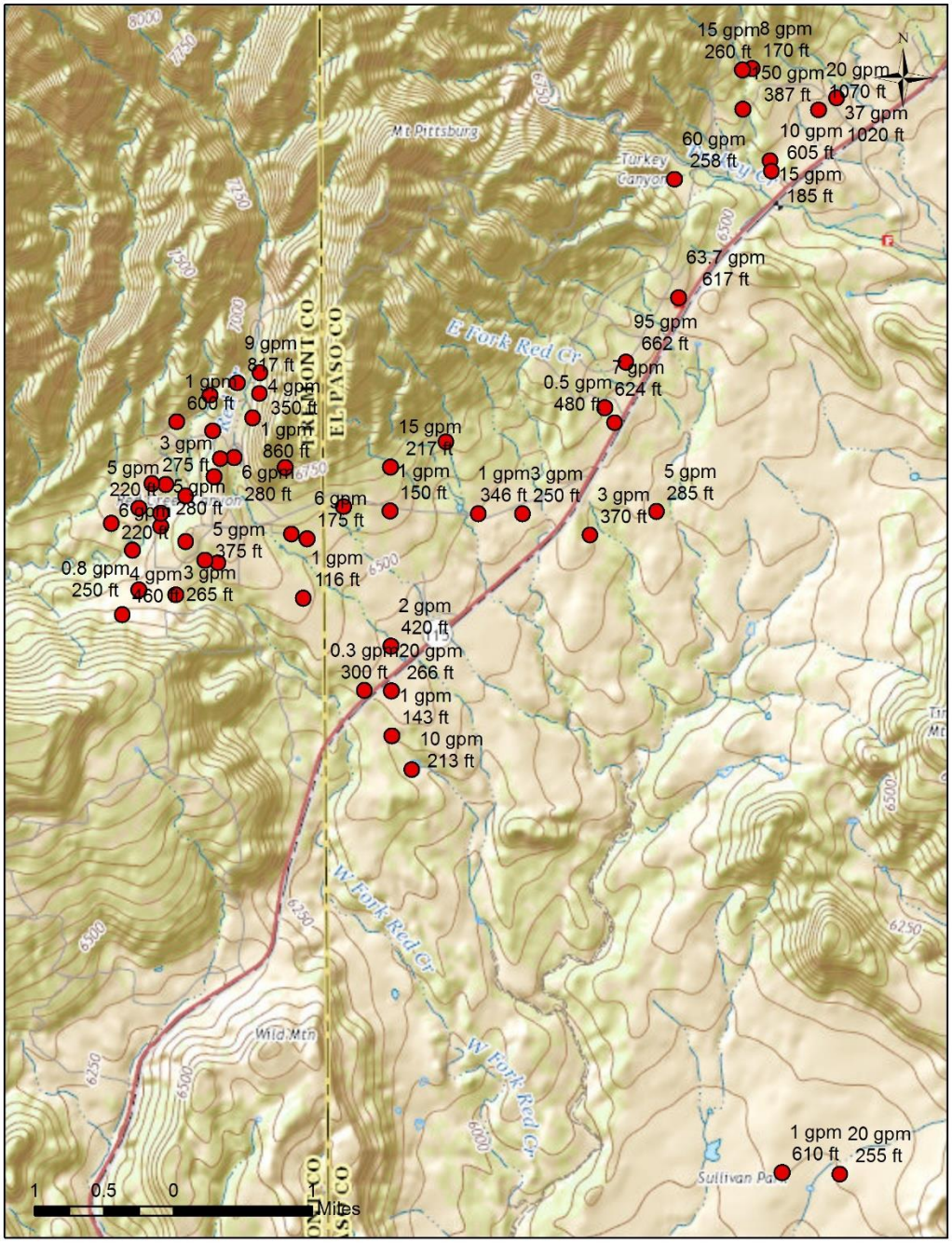


Figure 52. Fountain Formation well locations with yield and depth in the Mount Pittsburg quadrangle. Wells in highly dense clumps are unlabeled due to the method ArcGIS uses to label points.

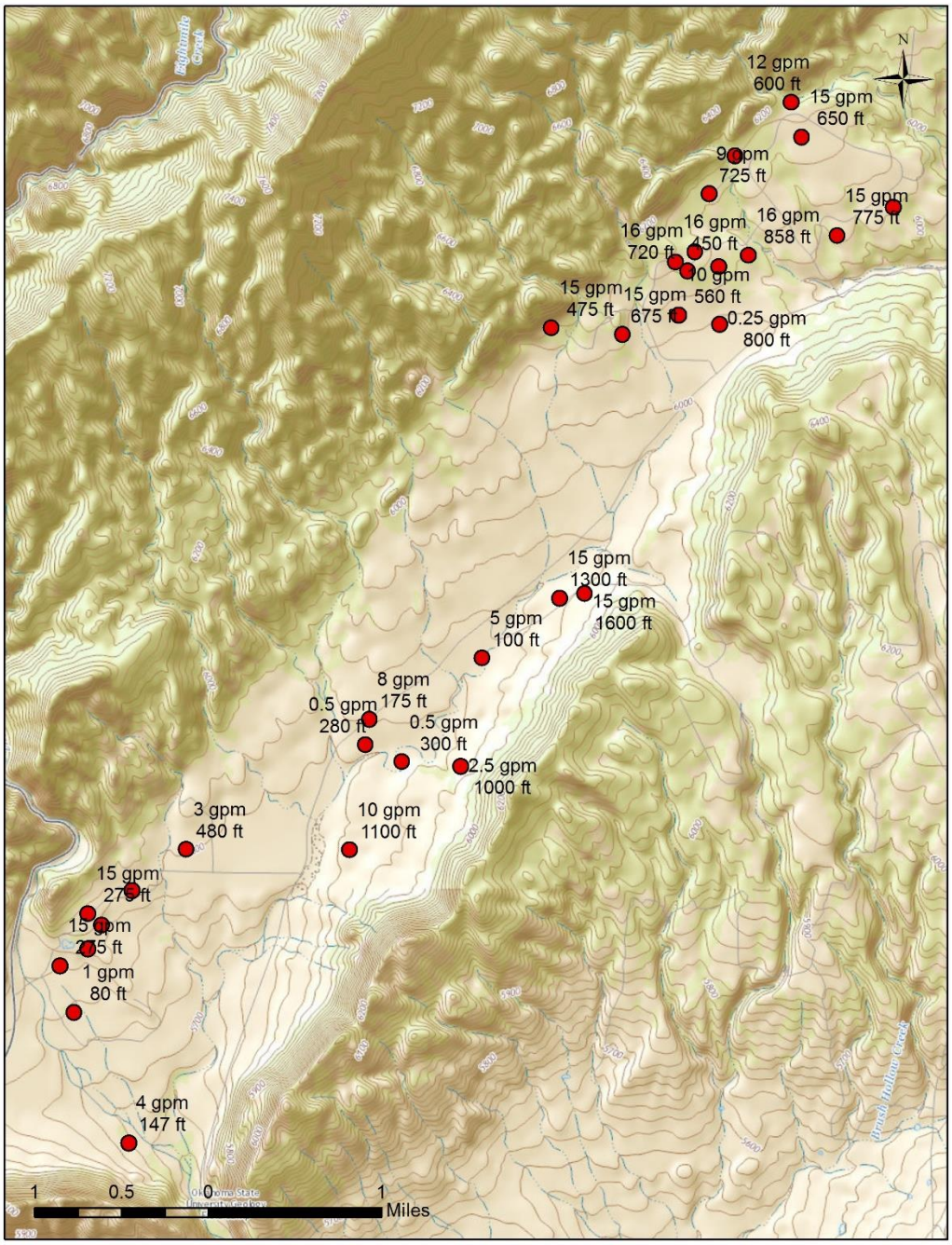


Figure 53. Fountain Formation well locations with yield and depth in the Phantom Canyon quadrangle.

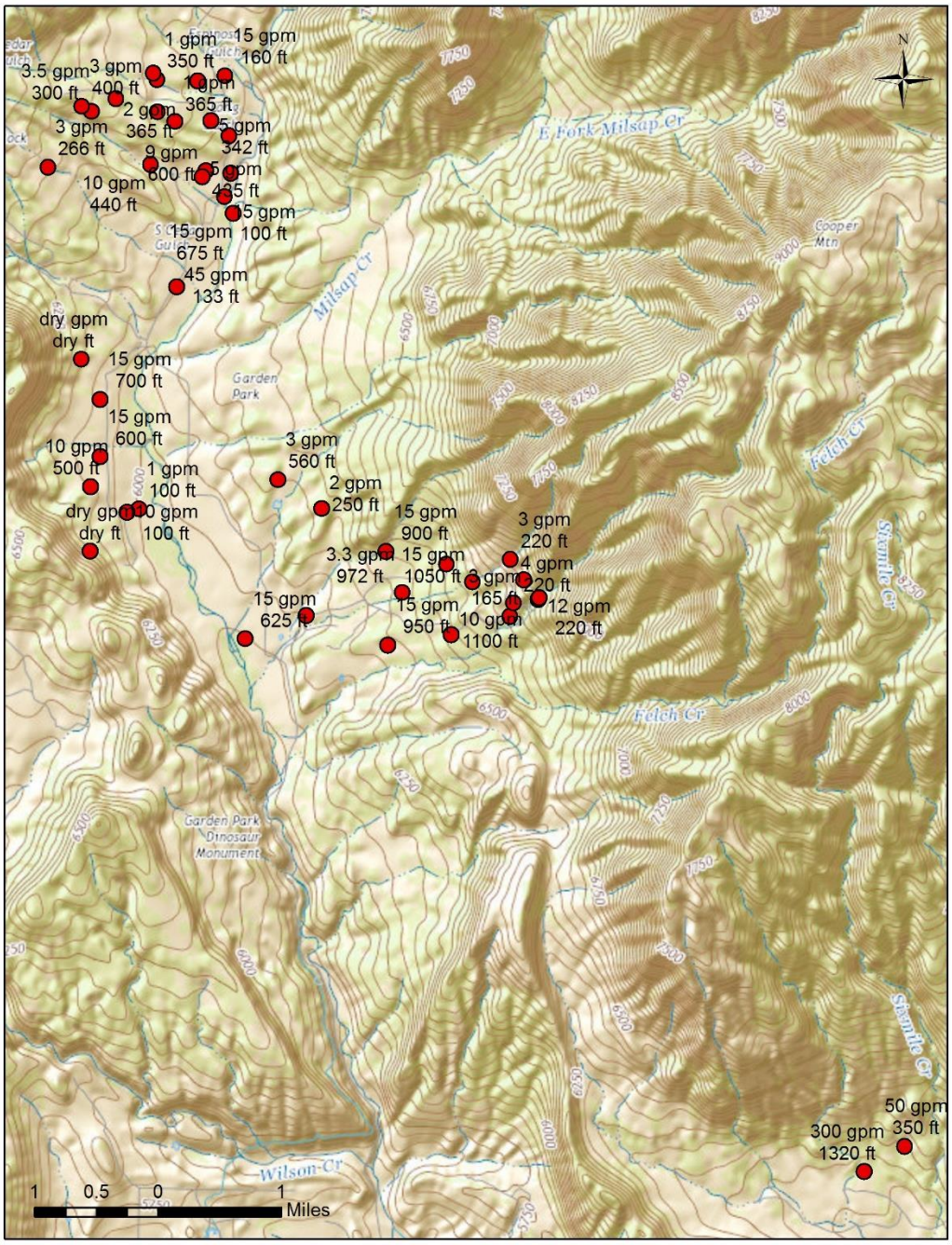


Figure 54. Fountain Formation well locations with yield and depth in the Cooper Mountain quadrangle.

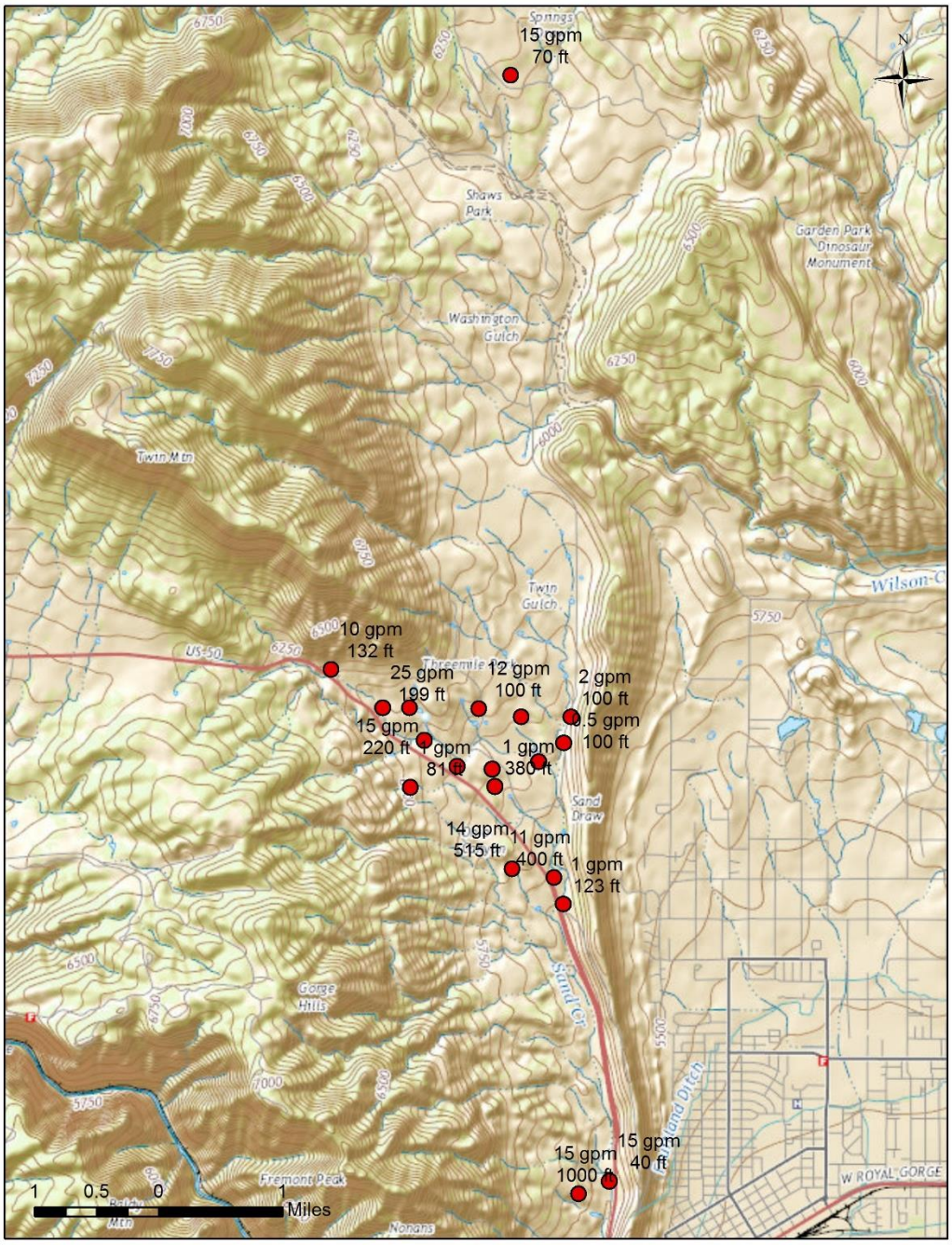


Figure 55. Fountain Formation well locations with yield and depth in the Cover Mountain and Royal Gorge quadrangles.

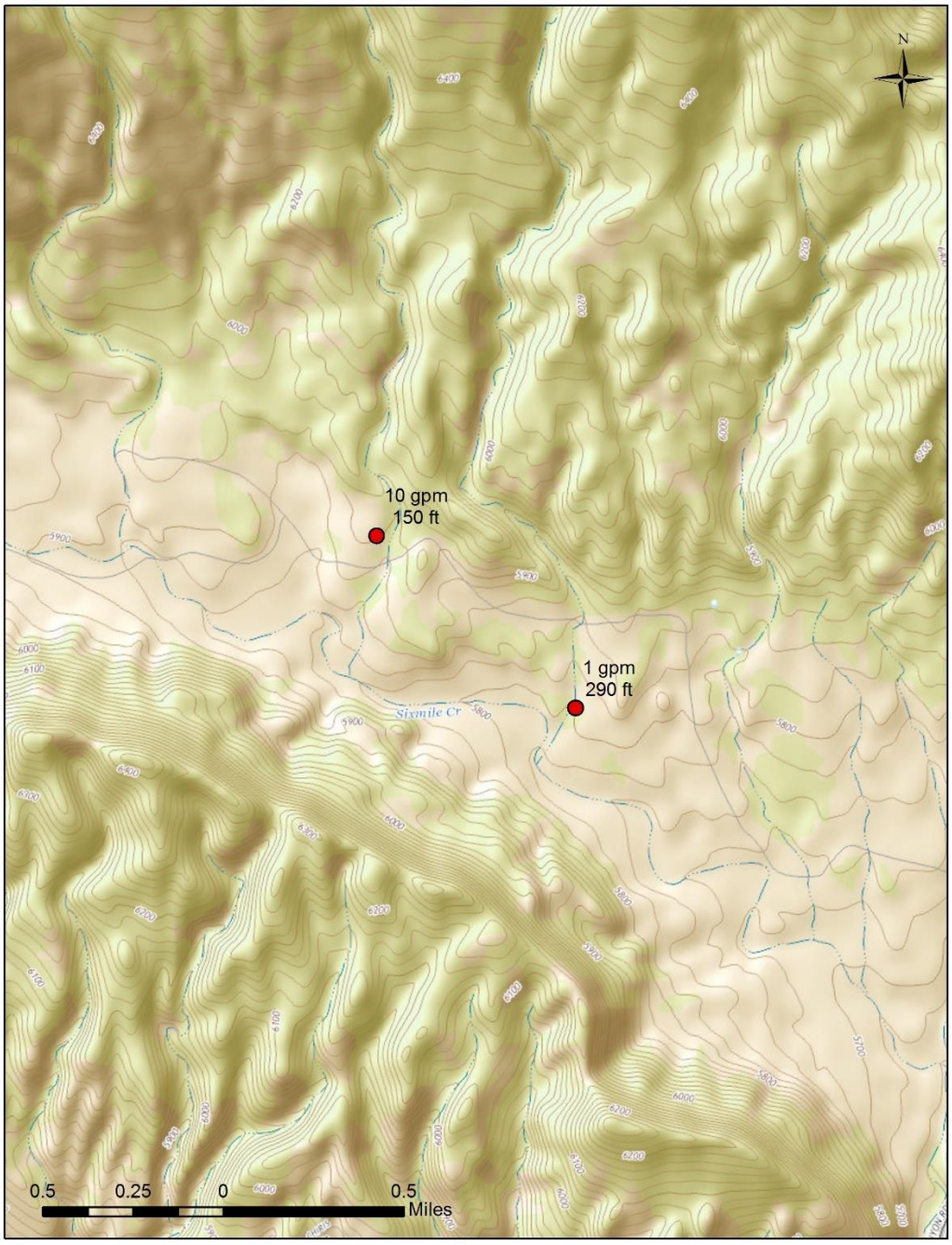


Figure 56. Fountain Formation well locations with yield and depth in the Canon City quadrangle.

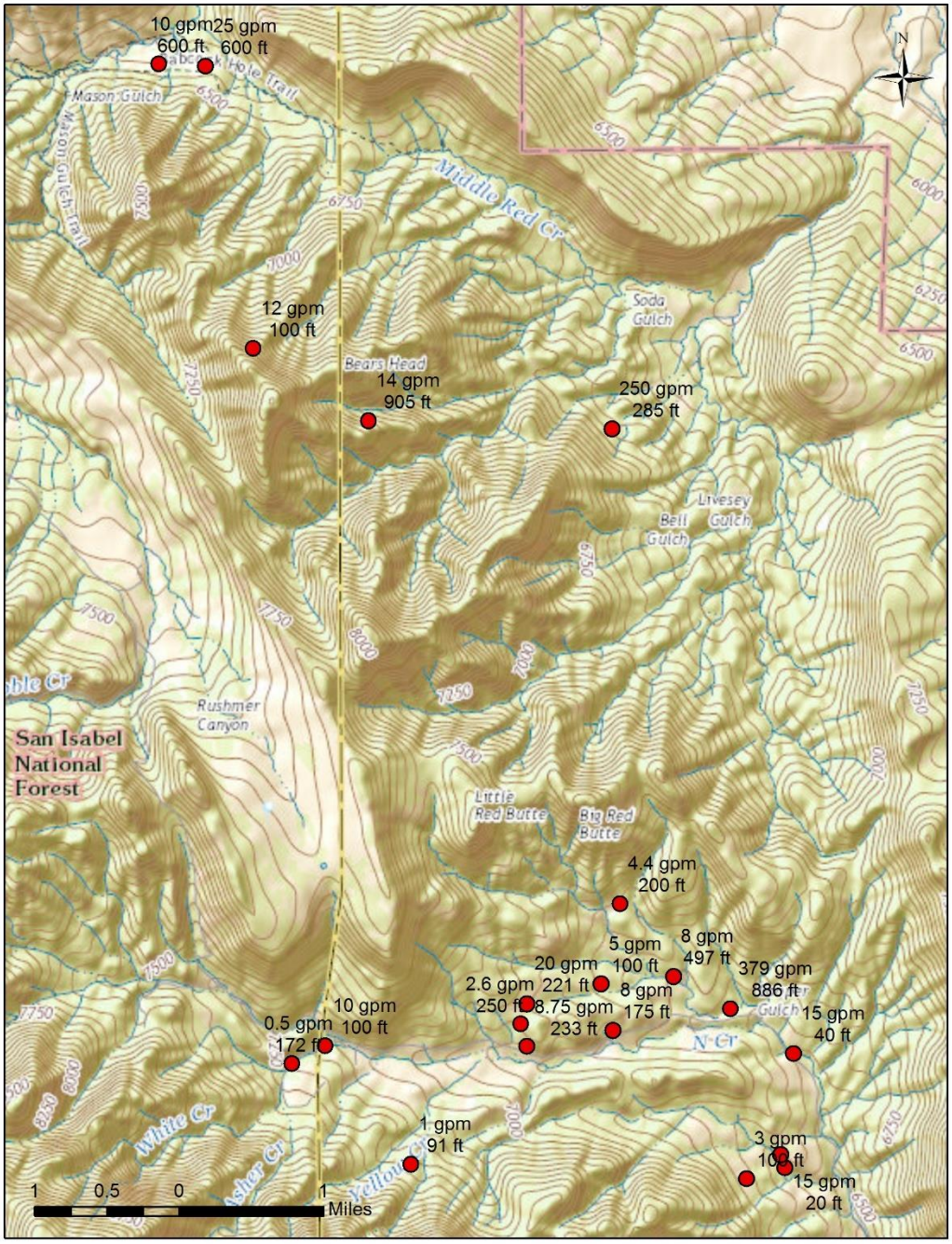


Figure 57. Fountain Formation well locations with yield and depth in the Wetmore quadrangle.

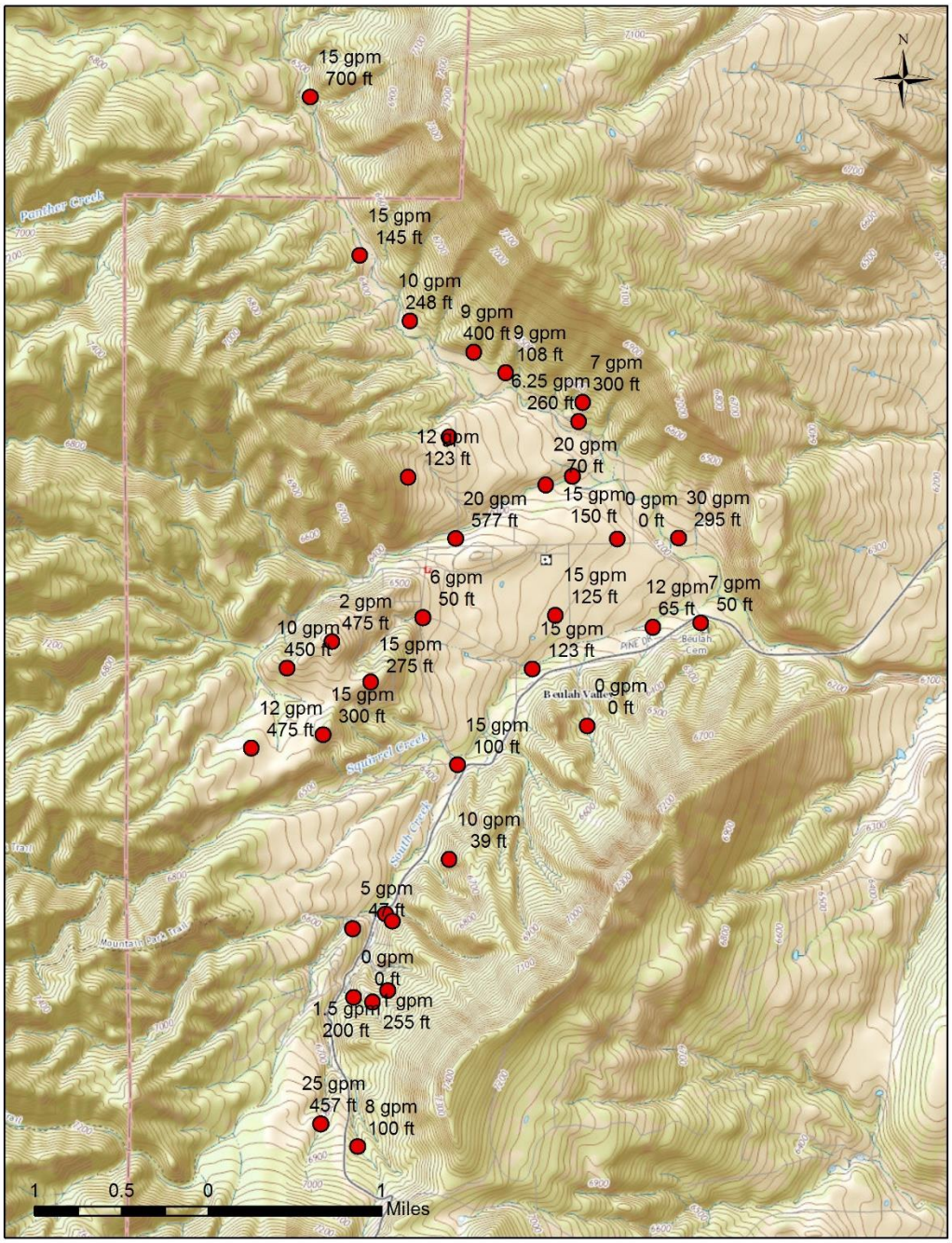


Figure 58. Fountain Formation well locations with yield and depth in the Beulah quadrangle.

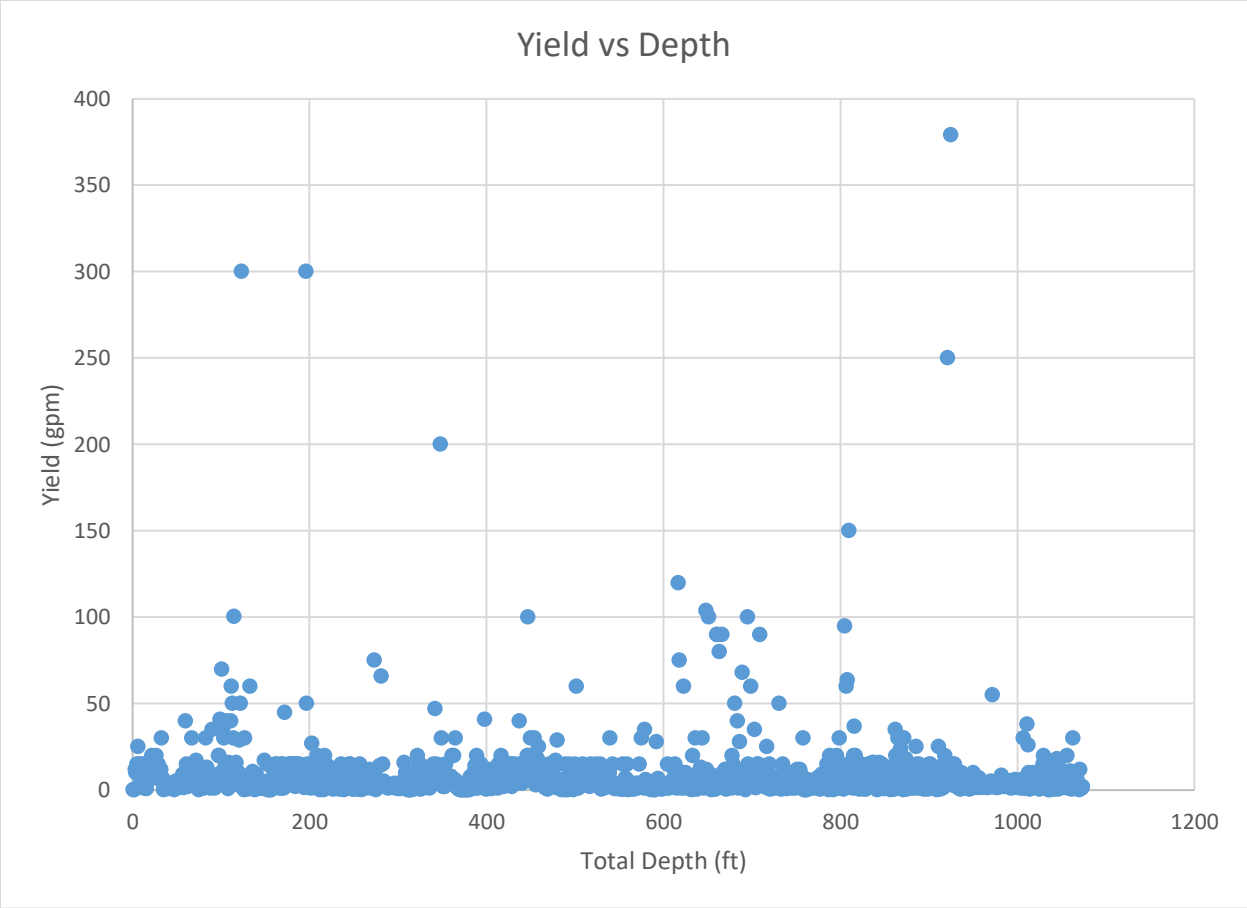


Figure 59. Yield versus depth for all Fountain wells.

5.3 Specific Capacity

Specific capacity for the Fountain Formation was calculated and ranges from 0.0001 gpm/ft to 23 gpm/ft and varies by county (Fig. 60). The highest average specific capacities are in Douglas and Pueblo counties while the highest maximum specific capacity is in Teller County. Domestic and household wells have the lowest median specific capacities. The well type with the highest Q1, median, and Q3 specific capacities are municipal wells (Fig. 61). Specific capacities for each quadrangle are listed in Table 3. The quadrangles with the highest median specific capacities are the Eldorado Springs, Dawson Butte, Cover Mountain, Wetmore, and Beulah quadrangles. The highest maximum specific capacities are found in the Carter Lake, Lyons, Golden, Mount Deception, and Woodland Park quadrangles.

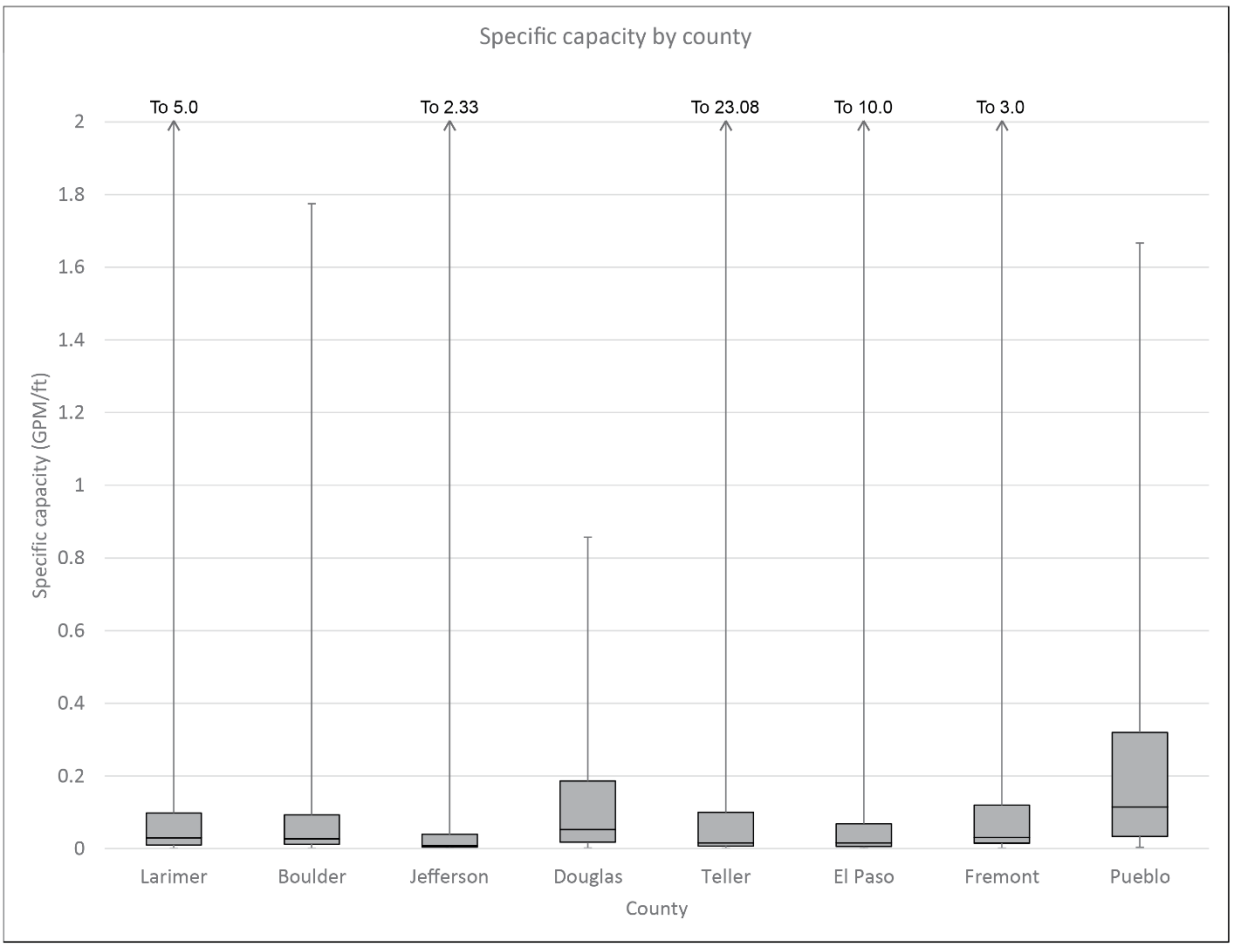


Figure 60. Box and whisker plot of specific capacity by county.

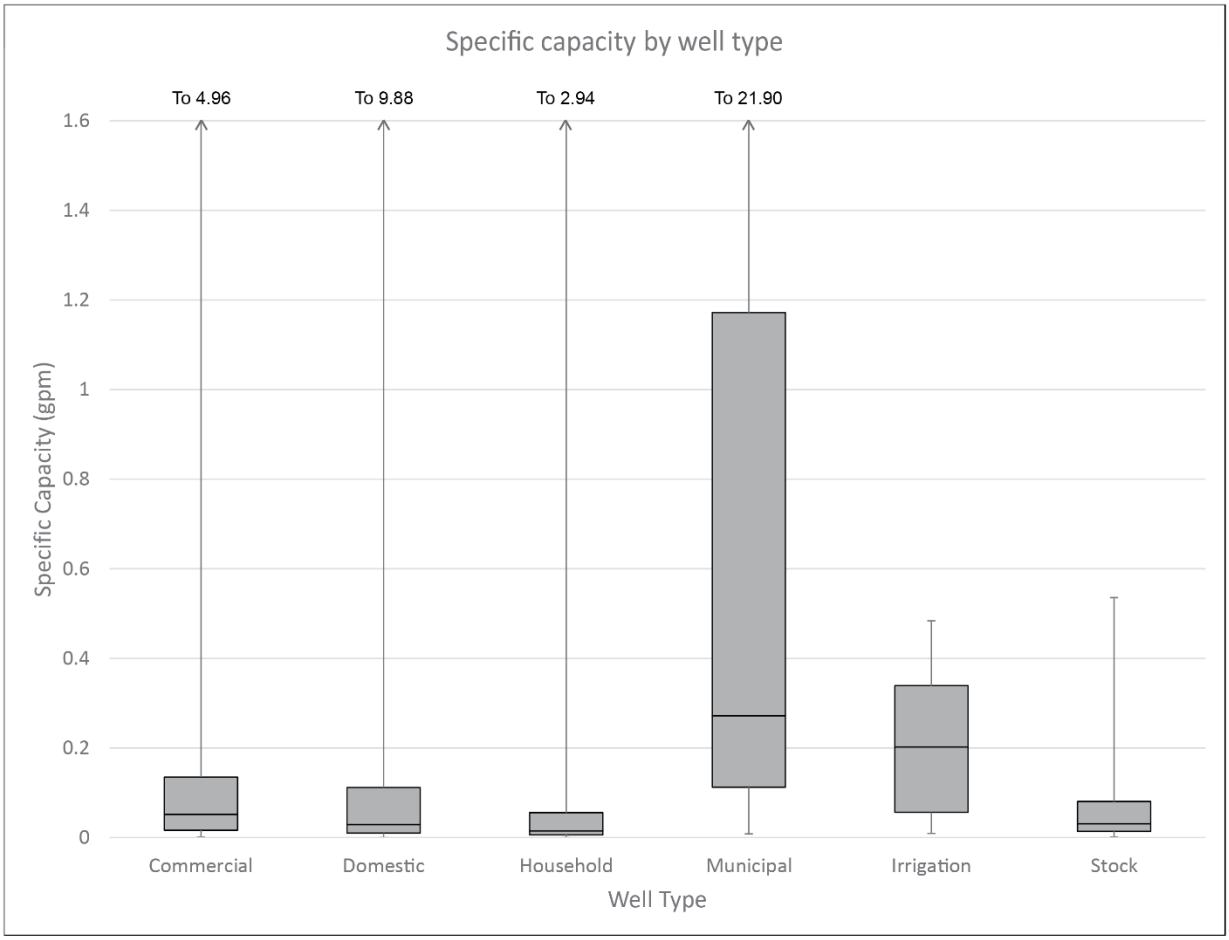


Figure 61. Box and whisker plot of specific capacity by well type.

Table 3. Statistics for Fountain specific capacity by quadrangle (values in gpm/ft). All values are significant to the tenths digit.

quadrangle	county	minimum	Q1	median	Q3	maximum
Virginia Dale	Larimer	0.0179	0.025	0.036	0.10	0.17
Table Mountain	Larimer	0.0248	0.025	0.025	0.02	0.02
Livermore Mountain	Larimer	0.0030	0.013	0.048	0.40	1.00
Livermore	Larimer	0.0014	0.018	0.027	0.07	0.80
Laporte	Larimer	0.0014	0.011	0.031	0.12	5.00
Buckhorn Mountain	Larimer	0.0417	0.042	0.042	0.04	0.04
Horsetooth Reservoir	Larimer	0.0005	0.004	0.017	0.04	2.00
Masonville	Larimer	0.0012	0.012	0.024	0.05	0.80
Pinewood Lake	Larimer	0.0002	0.004	0.022	0.07	0.14
Carter Lake	Larimer	0.0014	0.019	0.080	0.16	3.00
Lyons	Boulder	0.0001	0.017	0.037	0.12	1.50
Boulder	Boulder	0.0001	0.007	0.012	0.03	0.32
Eldorado Springs	Boulder	0.0444	0.073	0.102	0.13	0.16
Ralston Buttes	Jefferson	0.0049	0.006	0.019	0.04	0.06
Golden	Jefferson	0.0073	0.023	0.074	0.60	2.33
Morrison	Jefferson	0.0002	0.003	0.007	0.03	0.33
Indian Hills	Jefferson	0.0018	0.004	0.007	0.04	0.48
Kassler	Douglas	0.0200	0.020	0.038	0.09	0.18
Dawson Butte	Douglas	0.5769	0.577	0.577	0.58	0.58
Dakan Mountain	Douglas	0.0078	0.014	0.025	0.06	0.54
Larkspur	Douglas	0.0016	0.017	0.069	0.31	0.86
Mount Deception	Teller	0.0004	0.009	0.029	0.13	23.08
Woodland Park	Teller	0.0001	0.005	0.012	0.05	10.00
Manitou Springs	El Paso	0.0108	0.023	0.040	0.08	0.21
Cheyenne Mountain	El Paso	0.0017	0.004	0.014	0.05	2.27
Cover Mountain	Fremont	0.2727	0.273	0.273	0.27	0.27
Cooper Mountain	Fremont	0.0038	0.017	0.030	0.08	0.65
Phantom Canyon	Fremont	0.0007	0.013	0.031	0.09	0.20
Mount Pittsburg	El Paso	0.0011	0.014	0.034	0.10	5.10
Royal Gorge	Fremont	0.0033	0.013	0.090	0.33	3.00
Canon City	Fremont	0.0108	0.030	0.049	0.07	0.09
Wetmore	Custer	0.0167	0.038	0.212	0.41	1.50
Beulah	Pueblo	0.0054	0.040	0.138	0.23	1.67

5.4 Water Level Elevation Maps

Water level elevation maps were made for 10 selected quadrangles (Figures 62 to 71). The selected quadrangles, ordered north to south, include Laporte, Horsetooth Reservoir, Carter Lake, Pinewood Lake, Lyons, Larkspur, Mount Deception, Woodland Park, Mount Pittsburg, and Cooper Mountain. Each dot on the map is a well and the contour intervals are 40 feet. The Laporte, Pinewood Lake, and Woodland Park quadrangles have a southeasterly flow direction. The Horsetooth Reservoir and Carter Lake quadrangles have an easterly flow direction. The Larkspur quadrangle has a northerly flow direction. The Mount Deception quadrangle has a northwesterly flow direction. The Mount Pittsburg quadrangle has a southerly flow direction and the Cooper Mountain quadrangle has southwesterly flow direction.

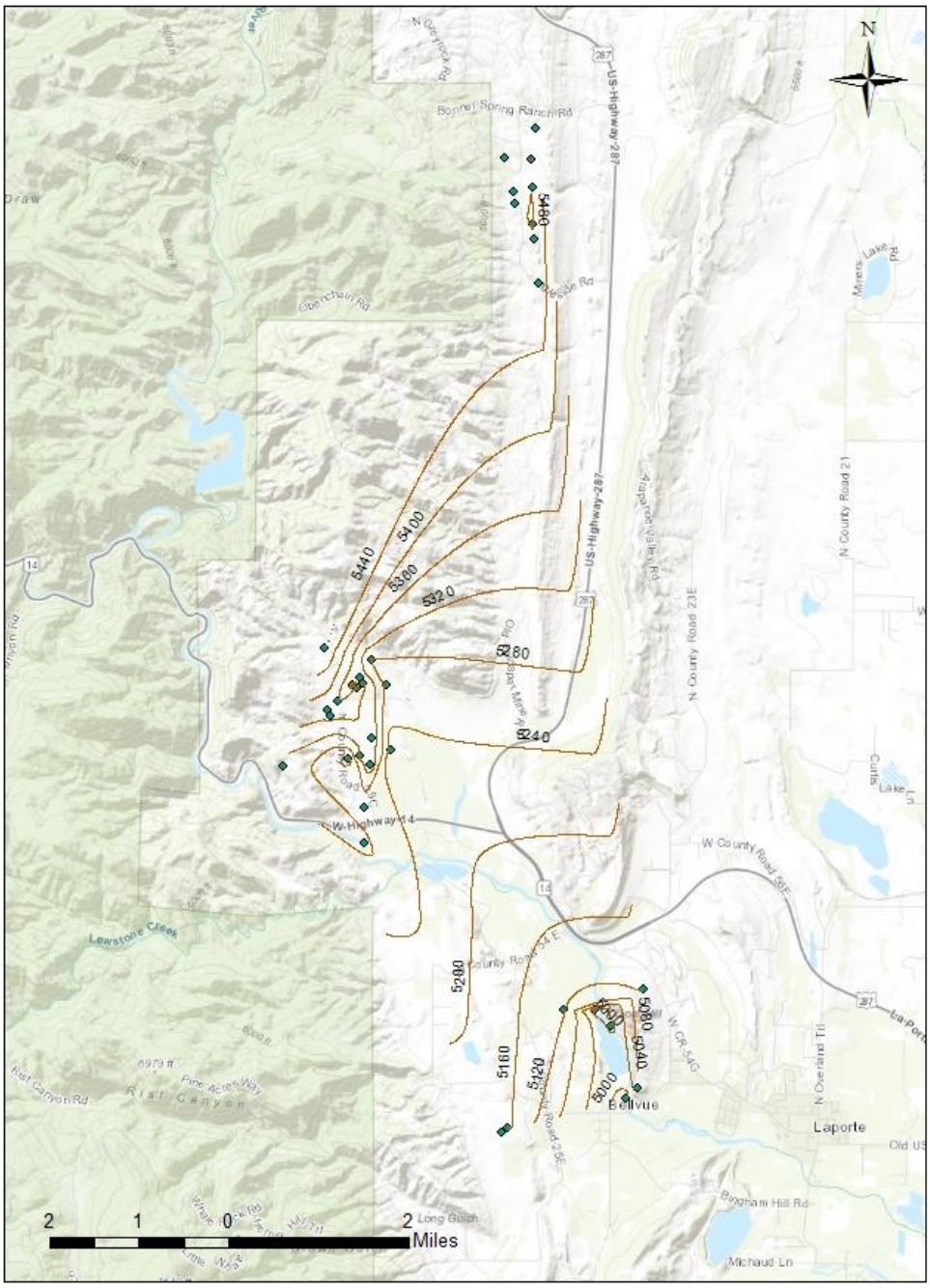


Figure 62. Water level elevation map for the Laporte quadrangle. Contour interval is 40 feet.

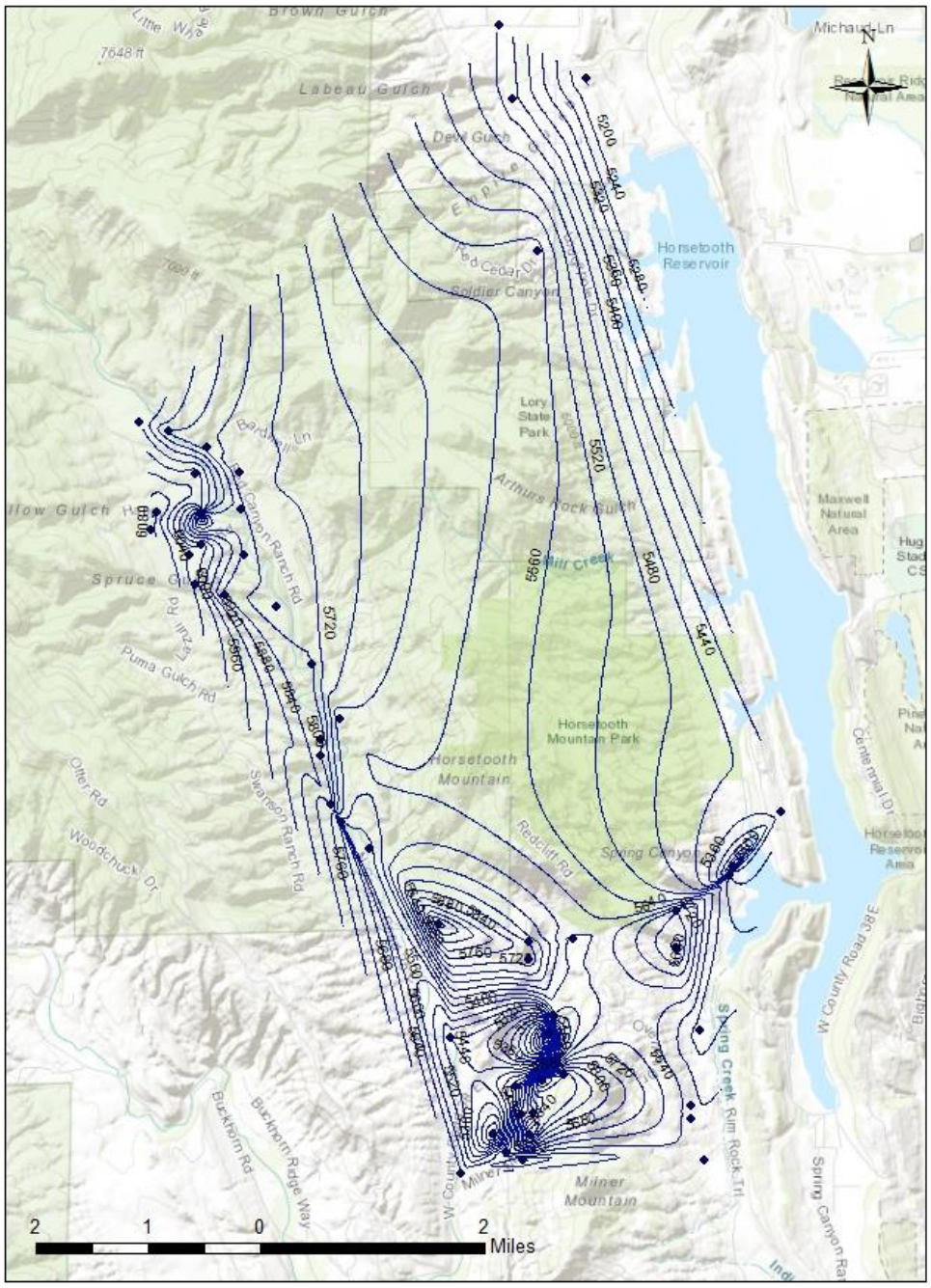


Figure 63. Water level elevation map for the Horsetooth Reservoir quadrangle. Contour interval is 40 feet.

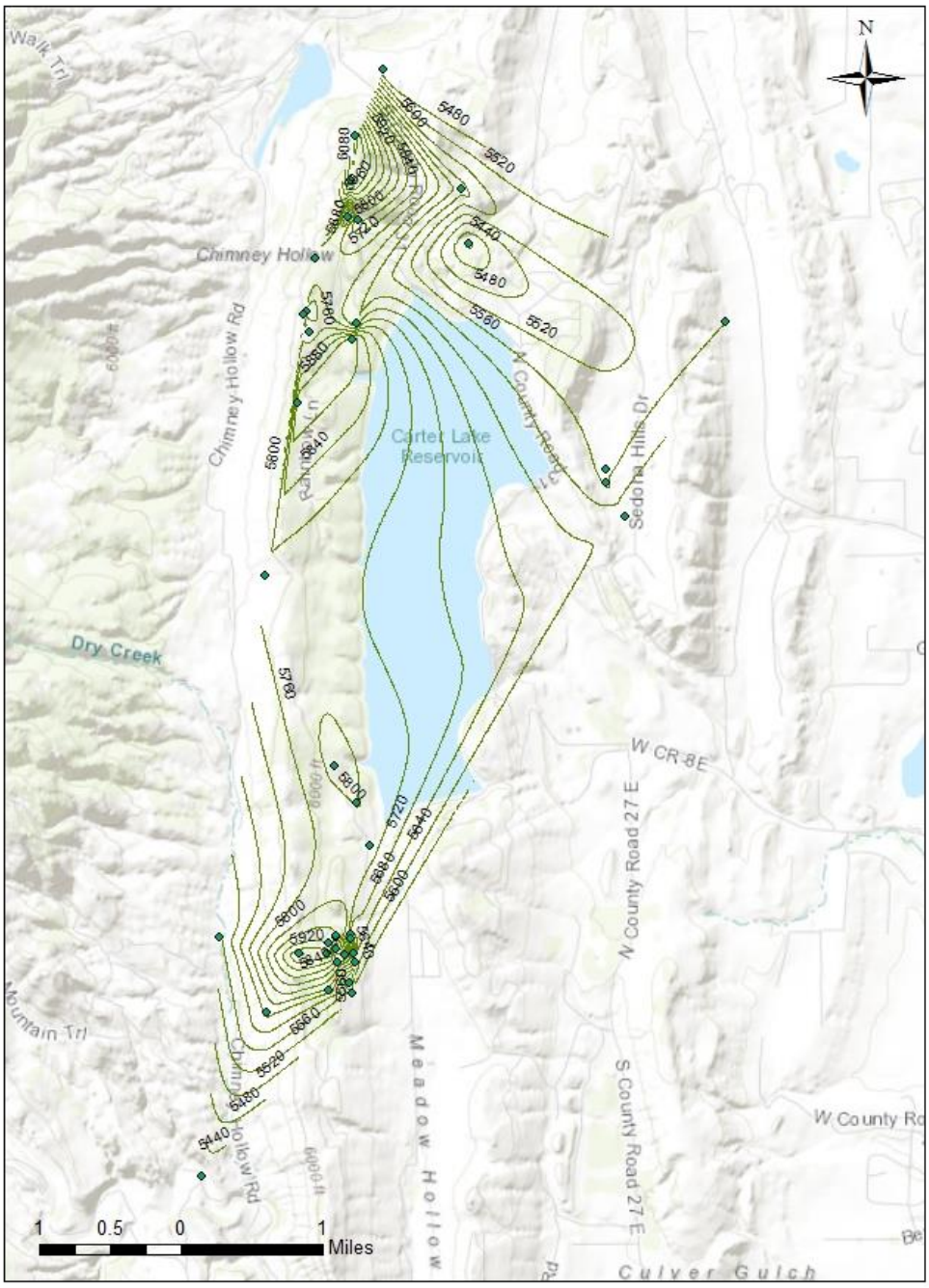


Figure 64. Water level elevation map for the Carter Lake quadrangle. Contour interval is 40 feet.

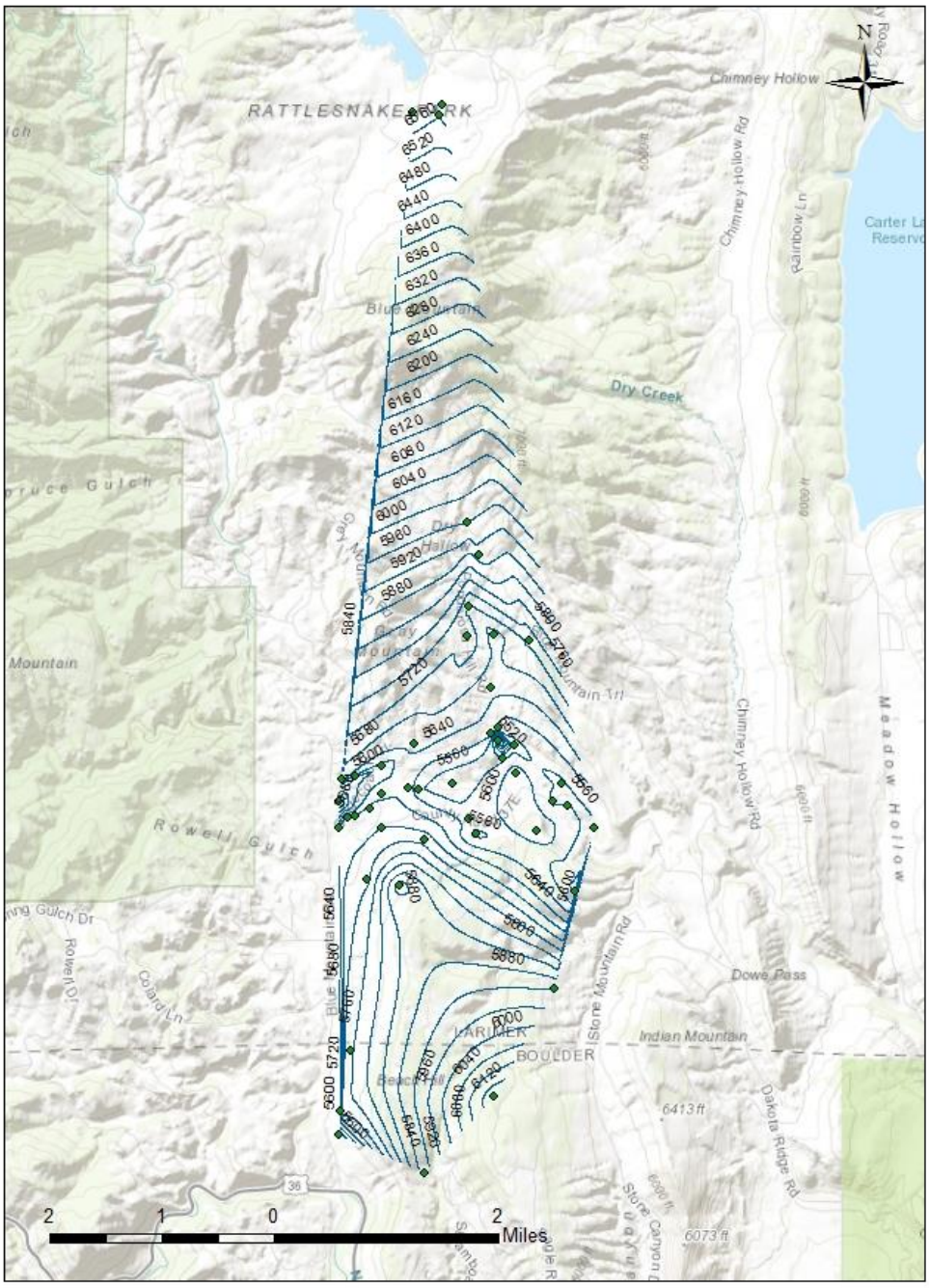


Figure 65. Water level elevation map for the Pinewood Lake quadrangle. Contour interval is 40 feet.

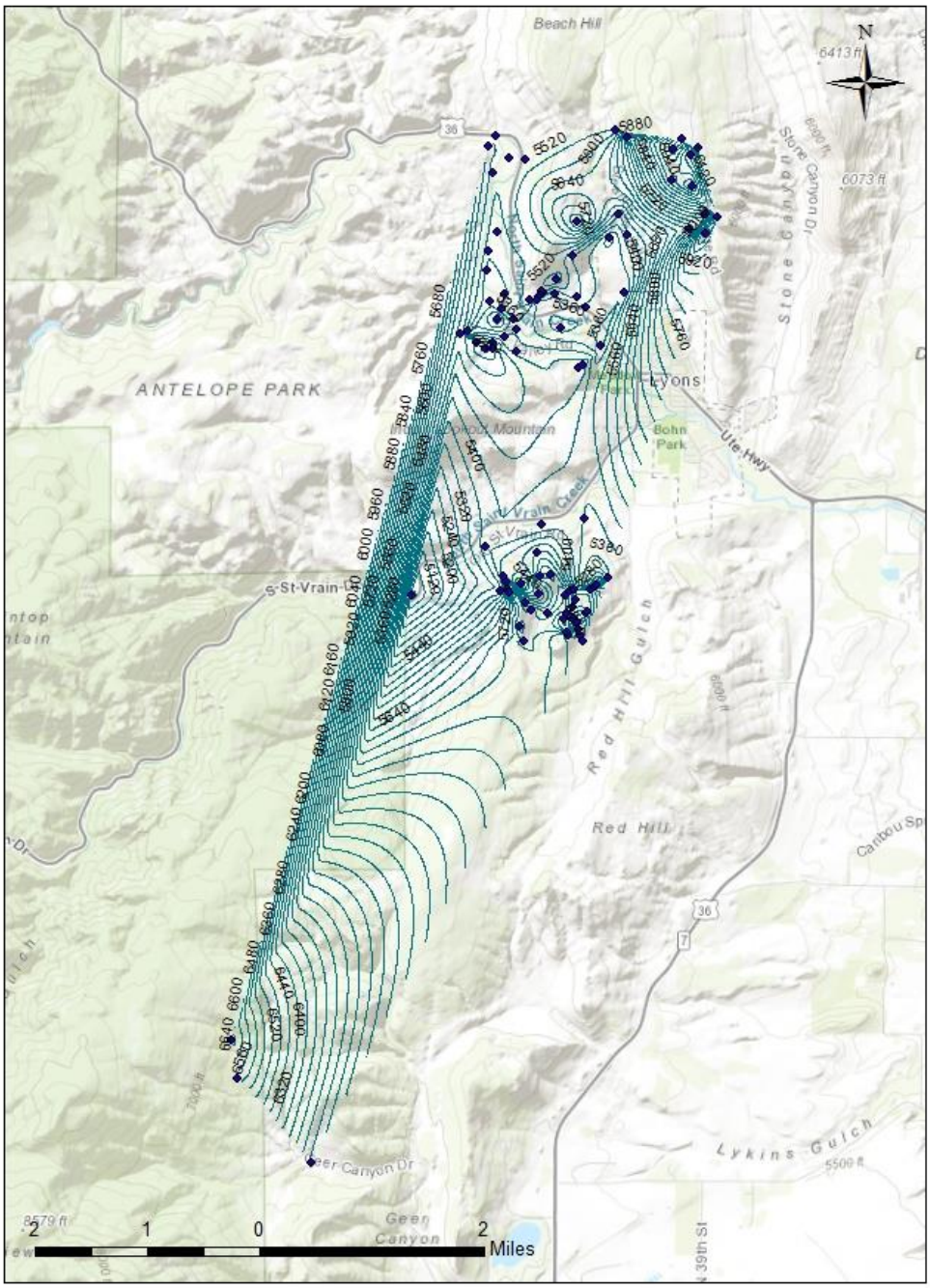


Figure 66. Water level elevation map for the Lyons quadrangle. Contour interval is 40 feet.

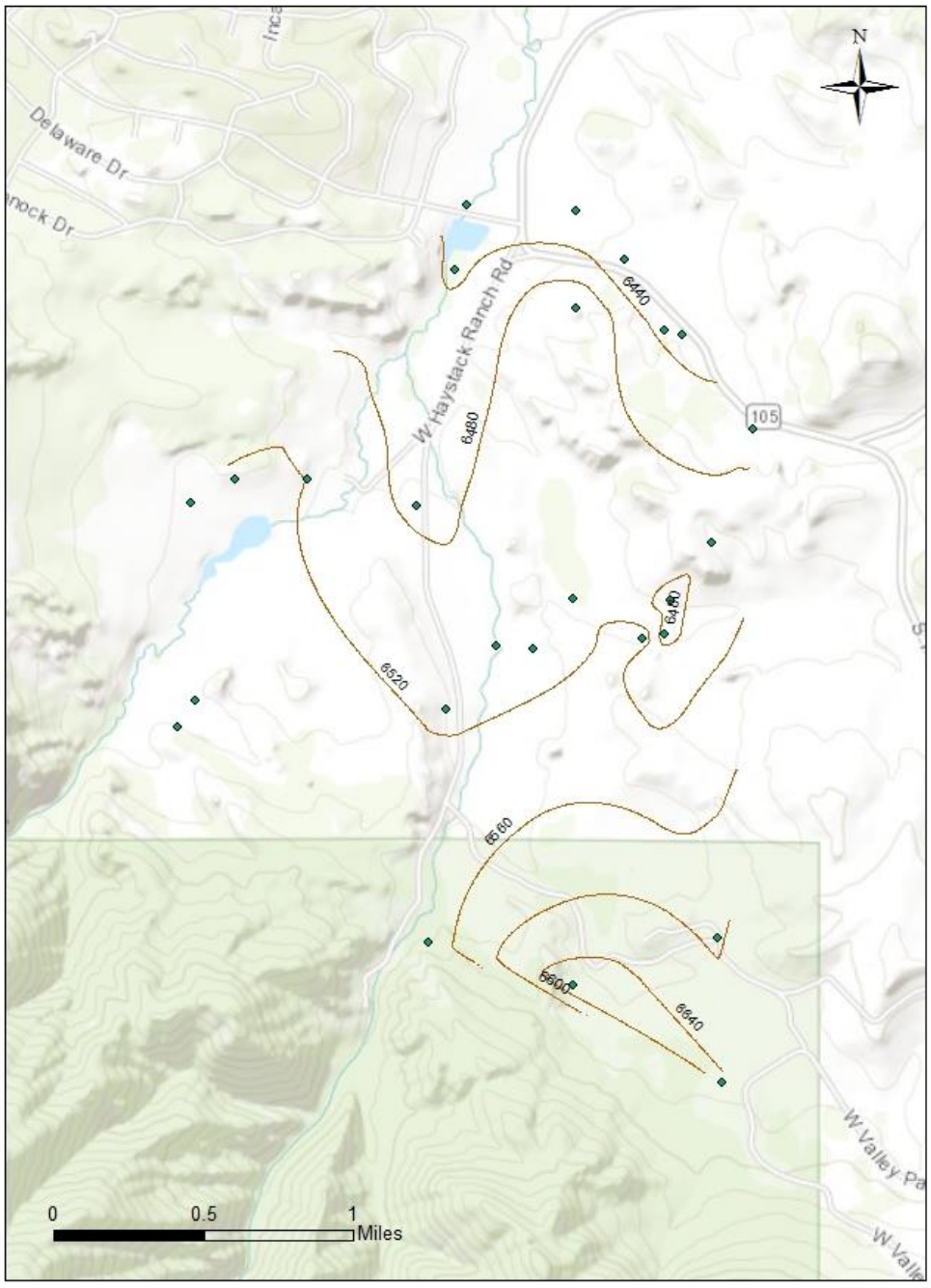


Figure 67. Water level elevation map for the Larkspur quadrangle. Contour interval is 40 feet.

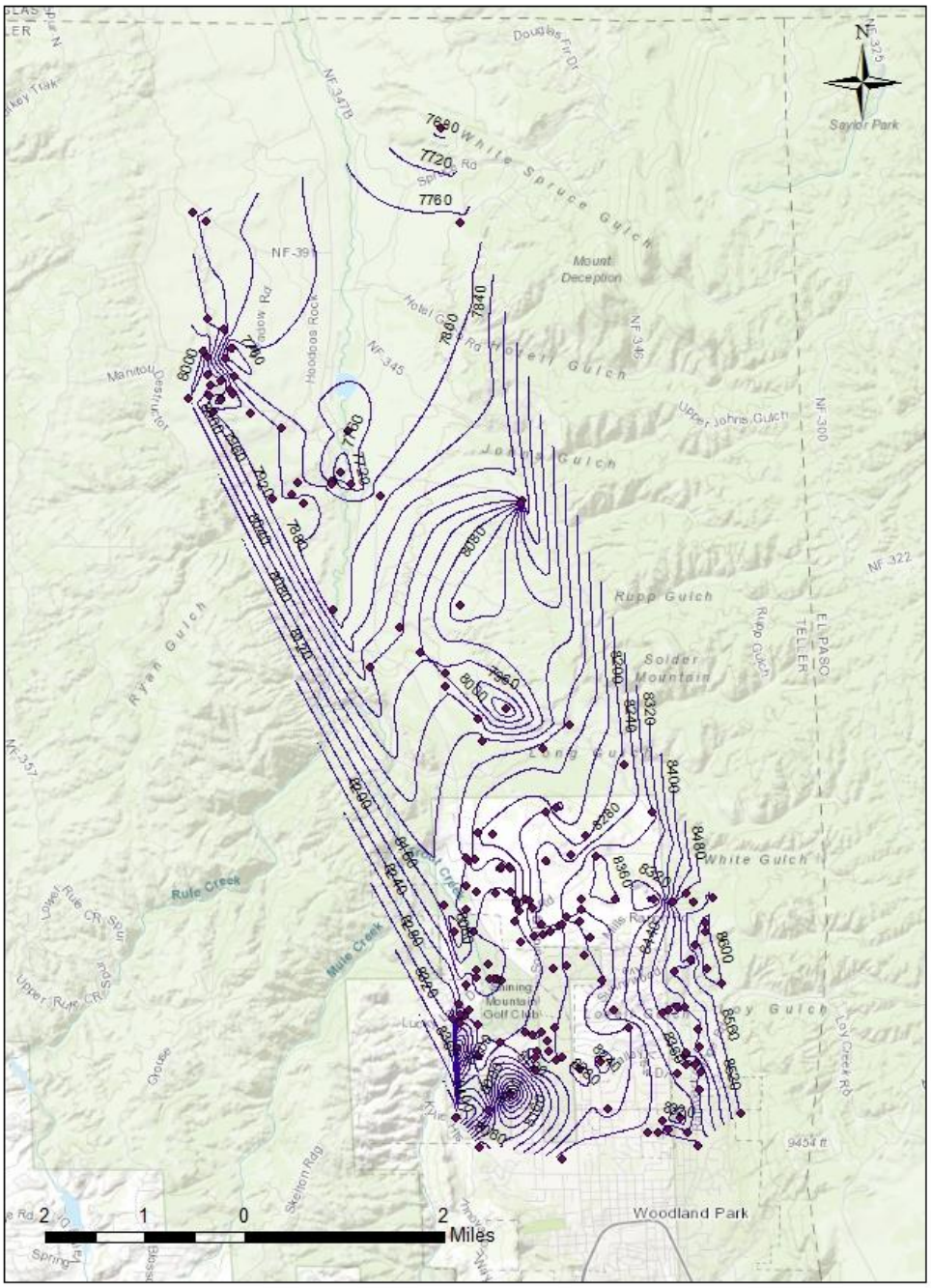


Figure 68. Water level elevation map for the Mount Deception quadrangle. Contour interval is 40 feet.

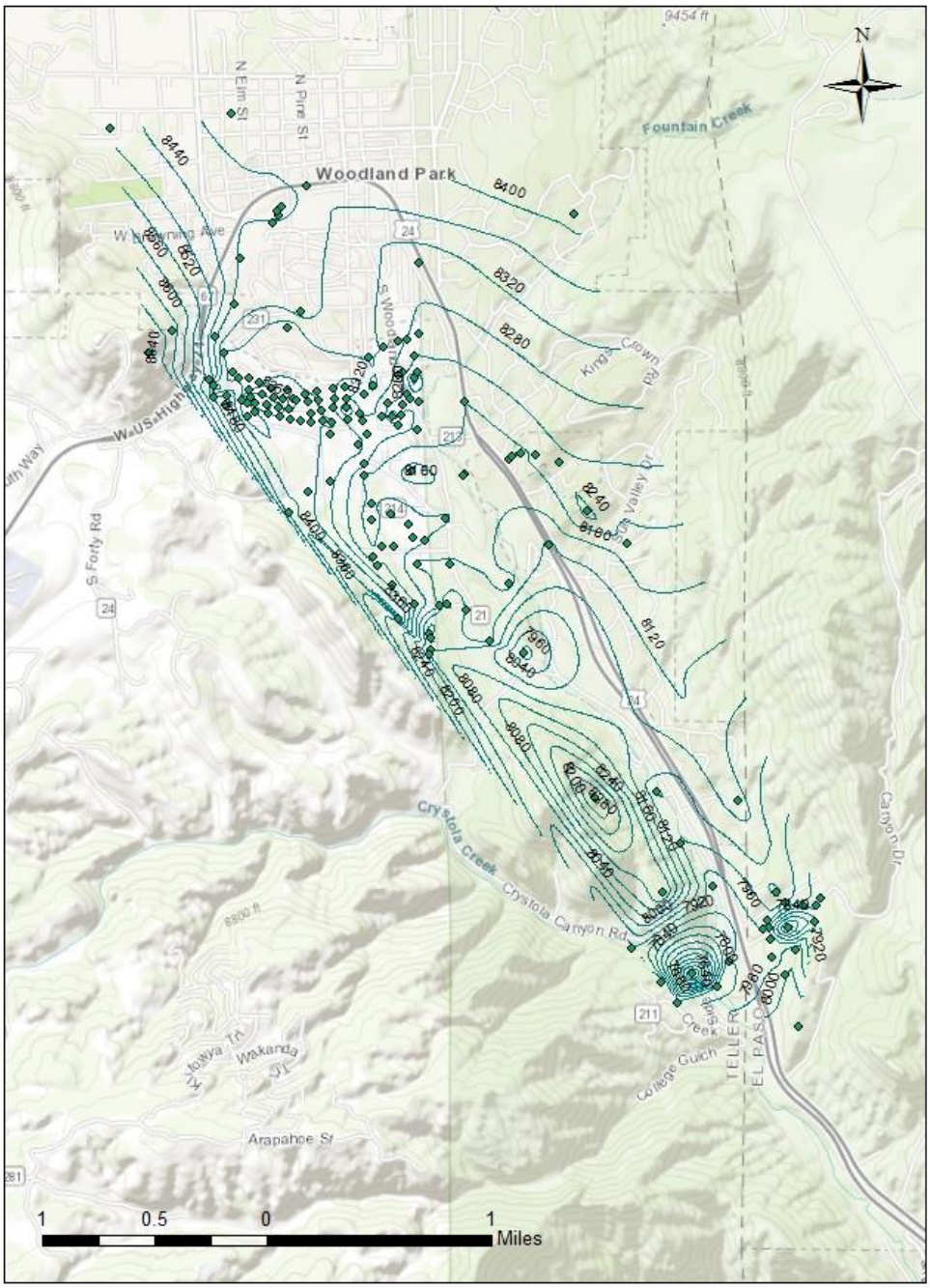


Figure 69. Water level elevation map for the Woodland Park quadrangle. Contour interval is 40 feet.

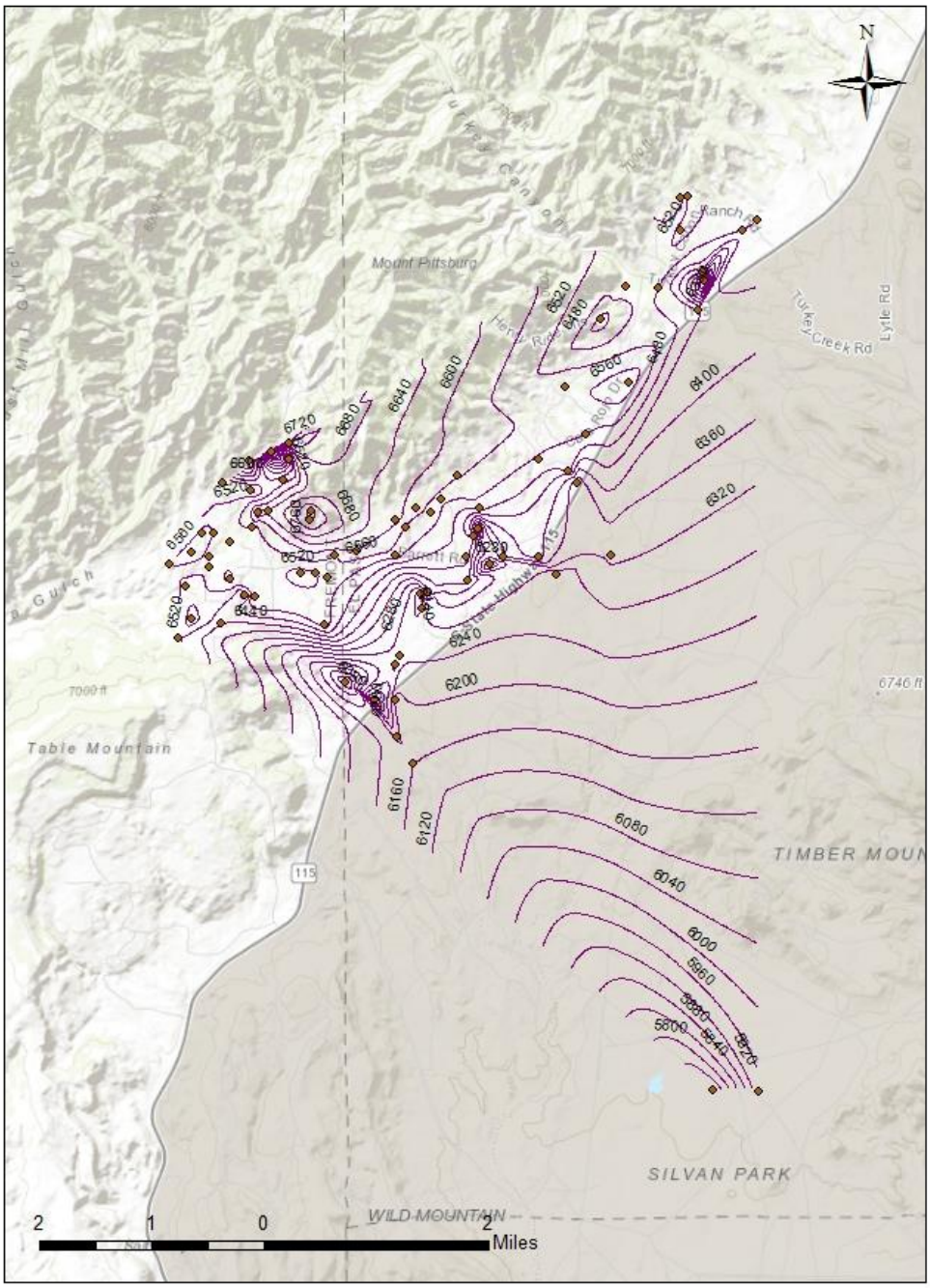


Figure 70. Water level elevation map for the Mount Pittsburg quadrangle. Contour interval is 40 feet.

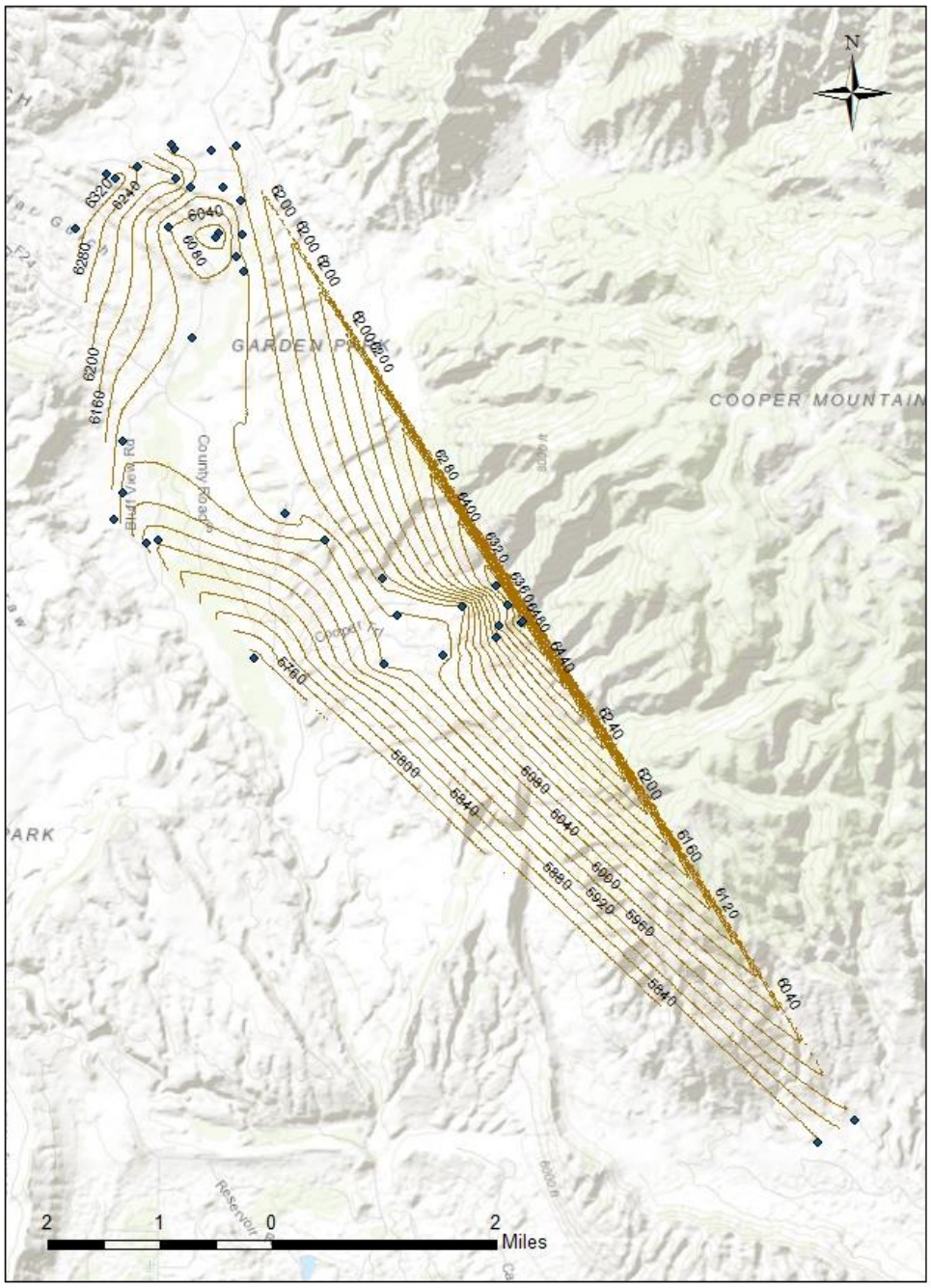


Figure 71. Water level elevation map for the Cooper Mountain quadrangle. Contour interval is 40 feet.

5.5 Permeability Tests

The laboratory permeability testing was performed on the following facies: coarse grained, planar laminated sandstone; fine-grained, white, massive sandstone; purple mudstone; red to gray, cross-bedded conglomerate; white, structureless conglomerate; coarse-grained, red, cross-bedded sandstone; and fine grained, red, massive sandstone (Table 4). The facies that could not be tested included conglomerates and coarse-grained sandstones which were poorly cemented and friable.

Table 4. Estimated permeabilities for samples collected from the Owl Canyon outcrop.

sample	k (cm^2)	millidarcy	description
OC-1	1.76E-10	17.83	coarse-grained, red, planar laminated sandstone
OC-2	2.32E-10	23.50	fine-grained, white, massive sandstone
OC-3	7.49E-11	7.59	purple mudstone
OC-4	1.35E-10	13.70	red to gray, cross-bedded conglomerate
OC-5	9.48E-11	9.60	white, structureless conglomerate
OC-6A	1.57E-10	15.90	coarse-grained, red, cross-bedded sandstone
OC-m	6.32E-11	6.40	fine-grained, red, massive sandstone

CHAPTER 6. DISCUSSION

6.1 AquaMap Data

The data collected from AquaMap provide an inventory of hydraulic data from water wells completed in the Fountain Formation. The data also show that the Fountain is used as a water resource along most of the Front Range for multiple purposes such as for drinking water, agriculture, and commercial use. In addition, the data has been used to calculate some of the hydraulic properties that will allow us to assess the feasibility of ASR implementation within the Fountain Formation.

However, the data in this study have some limitations that should be addressed. The yields reported for the Fountain Formation are most likely much lower than potential yields. This is because most wells in the Fountain are domestic or household, while very few wells were constructed for municipal use. Household and domestic wells are built to only sustain the need of a single household and are typically built with a small diameter casing, low capacity screen, and a low capacity pump. Additionally, the State of Colorado limits domestic well production to 15 gpm. Furthermore, in many cases the wells only partially penetrate the formation. Another limitation of the dataset is that most of the data were recorded by well drillers is often incomplete. Some of the well test records are missing yield or depth and could not be used in this study. The coverage of data across the entire study area is also limited. There are many areas that have no wells or very limited use of the Fountain Formation as an aquifer. In these areas the Fountain cannot be evaluated for water use or ASR because there is no data available.

For example, the Table Mountain quadrangle only has 1 well. This is most likely because such areas are very sparsely populated or have access to other aquifers. In contrast, some areas may have hundreds of wells, such as the municipality of Woodland Park which is almost entirely built above the Fountain and has many households and several municipal wells drawing water from the formation.

The wells in the Fountain Formation are all located in a narrow, north-south trending band throughout the study area. This distribution of wells follows the Fountain Formation outcrop because the formation quickly reaches depths that are too deep for typical water wells. For example, near Fort Collins (Horsetooth Reservoir quadrangle, Fig. 18) the Fountain only has wells to the west of the reservoir where the formation is outcropping or is underlying alluvium or the Ingleside Formation. Immediately east of the reservoir the Fountain is 3000 feet deep. In many of the quadrangles, the majority of Fountain wells are spread out at individual households and usually appear in linear groups that follow the strike of the formation. In other cases, the Fountain wells occur in dense clusters where there are more households and people using the formation for water such as in a neighborhood. Quadrangles with relatively more wells and some municipal wells are areas where a town is using the Fountain for water. The Lyons, Boulder, Morrison, Mount Deception, and Woodland Park quadrangles contain municipalities with many wells in the Fountain Formation. The Cheyenne Mountain quadrangle does not correspond to a town but also has a few municipal wells.

Well production in the Fountain Formation appears to be dependent on well type, with municipal and irrigation wells having the highest production. Compared to

household and domestic wells, these types of wells are usually built with larger diameter casings, better screens, and higher capacity pumps. The quadrangles with the highest yields usually contain more wells than other quadrangles. However, there are some exceptions such as the Golden quadrangle which only has 7 wells but a median yield of 11 gpm, which is higher than most other quadrangles.

6.2 Aquifer Properties

Specific capacities for the Fountain Formation are also dependent on well type and are highest in municipal and irrigation wells. Overall specific capacities calculated for Fountain Formation wells are low. However, there are many examples of wells with specific capacities over 1 gpm/ft up to a maximum of 23 gpm/ft. Specific capacity values may also be deceptive because most of the well tests were run for 2 hours or less. Longer tests would most likely yield more accurate results and the recommended time for a well test should be 24 hours (Sterrett, 2007). In addition, the wells would likely have higher yields and thus higher specific capacities if they were built like a municipal well. Given a properly built well with a specific capacity of 1 gpm/ft and a drawdown of 1000 feet, a well could yield 1000 gpm. The quadrangles with the highest maximum specific capacities are the Mount Deception and Woodland Park quadrangles. The other quadrangles with maximum specific capacities above 1 gpm/ft are Laporte, Horsetooth Reservoir, Carter Lake, Lyons, Cheyenne Mountain, and Mount Pittsburg. Potential yields were calculated using the median and maximum specific capacities for selected quadrangles in Table 5.

Table 5. Potential yields by quadrangle calculated for drawdowns of 500 feet and 1000 feet. T is transmissivity for confined conditions and is calculated by multiplying specific capacity by 2000 gpd/ft (Sterrett, 2007).

quadrangle	specific capacity (gpm/ft)	T (gpd/ft)	yield (gpm) with drawdown of:	
			500 ft	1000 ft
Laporte – median	0.031	62	15.5	31
Laporte – maximum	5	10000	2500	5000
Horsetooth Reservoir – median	0.017	34	8.5	17
Horsetooth Reservoir – maximum	2	4000	1000	2000
Masonville – median	0.024	48	12	24
Masonville – maximum	0.8	1600	400	800
Carter Lake – median	0.08	160	40	80
Carter Lake – maximum	3	6000	1500	3000
Masonville – median	0.024	48	12	24
Masonville – maximum	0.8	1600	400	800
Carter Lake – median	0.08	160	40	80
Carter Lake – maximum	3	6000	1500	3000
Pinewood Lake – median	0.022	44	11	22
Pinewood Lake – maximum	0.14	280	70	140
Lyons – median	0.037	74	18.5	37
Lyons – maximum	1.5	3000	750	1500
Golden – median	0.074	148	37	74
Golden – maximum	2.33	4660	1165	2330
Larkspur – median	0.069	138	34.5	69
Larkspur – maximum	0.86	1720	430	860
Mount Deception – median	0.029	58	14.5	29
Mount Deception – maximum	23.08	46160	11540	23080
Woodland Park – median	0.012	24	6	12
Woodland Park – maximum	10	20000	5000	10000
Mount Pittsburg – median	0.034	68	17	34
Mount Pittsburg – maximum	5.1	10200	2550	5100
Cooper Mountain – median	0.03	60	15	30
Cooper Mountain – maximum	0.65	1300	325	650

In general, the water level elevation maps in Chapter 5 show that the direction of water flow in the Fountain follows the direction of dip. From the Colorado-Wyoming border to around Colorado Springs, the Fountain has an easterly dip and an easterly or southeasterly water flow direction. From Colorado Springs to Canon City the Fountain Formation changes dip direction to the south, and the water flow direction is also towards the south or southwest. Also present in many of these water level elevation maps are cones of depression where a single well or a cluster of wells with a high drawdown are affecting the contour lines of the surrounding area. The most significant limitation of these maps is that the water elevation data comes from wells that were drilled during different years with a range spanning several decades. It is possible that the water levels may be significantly different today. However, these maps provide a reconnaissance-level approximation of the water elevation surface in the Fountain Formation. Another limitation of the data is that in many quadrangles the data is too sparse to make a good contour map so maps could only be made for a limited selection of quadrangles.

Faulting in the study area may serve either as a hydraulic connection within the formation or to other aquifers or as a barrier to flow. There are major faults in the study area that laterally and vertically offset portions of the Fountain Formation. For example, in the Laporte quadrangle the Fountain Formation is offset by multiple major faults that trend NW-SE. Major faults are shown on USGS maps but there may also be minor faults that offset smaller portions of the Fountain. Some of these faults place the Fountain adjacent to other formations. While faulting may affect groundwater flow within

the Fountain Formation, it is not clear from the water level elevation maps in this study if there is any correlation between faults and groundwater flow.

Recharge to the Fountain Formation most likely occurs in the area where the formation is outcropping or is directly beneath alluvium. It may also be possible that the formation receives recharge from faults in the Precambrian rock adjacent to and uphill from the Fountain. In other areas, the Fountain is most likely confined by overlying strata that contain carbonates and shales. In addition, the Fountain may be hydraulically connected to surface waters, especially where there are rivers or surface reservoirs that intersect the outcrop of the formation. Some of the wells with high yields may be affected by recharge from hydraulically connected surface waters. For example, wells in the Laporte quadrangle with high yields are very close to the Cache La Poudre River. In the Carter Lake quadrangle there are a few wells to the east of Carter Lake Reservoir that have much higher yields compared to the wells to the west of the reservoir. However, there are also many quadrangles in this study where no major surface water is present near the Fountain Formation and there are high yield wells present. For example, the Mount Deception and Woodland Park quadrangles have municipal wells in the Fountain and no surface water is present.

6.3 Permeability Data

The data collected from air permeameter tests show that the well cemented samples do not vary much in permeability. The permeability is very low but expected for a well cemented sandstone. Unfortunately, the less cemented facies within the Fountain

could not be tested using this method. It is likely that these facies have a much higher permeability than the facies tested in this study. The lithology found in the Fountain Formation is heterogeneous and can change from a conglomerate to a sandstone to a mudstone all within a few meters. The change in facies occurs laterally as well as vertically within the formation. This heterogeneity most likely allows for significant water storage volumes. The low permeability facies may likely act as baffles to groundwater flow.

6.4 Assessment of ASR Potential

The results of this study suggest that the Fountain Formation has aquifer properties that make it a feasible storage zone for ASR. The formation has numerous household wells throughout most of the study area which demonstrates that the formation contains water that is of high enough quality to be used for drinking water. The formation is also close to existing water supply infrastructure that would make implementing ASR more viable. Some towns, as noted previously in this chapter, already have several municipal wells in the formation and draw water from it. Other Front Range municipalities, for example Fort Collins, currently do not have municipal wells in the Fountain but do have water supply infrastructure close to areas where the formation is at an optimal depth. In both these cases an ASR wellfield could be constructed in areas that could take advantage of the existing infrastructure. The Fountain Formation has some municipal and irrigation wells that have high yields and specific capacities. The presence of these wells suggests that the Fountain Formation as an aquifer has the potential for high yield wells that would be suited for ASR. The

lithology of the Fountain is also likely advantageous for ASR. The formation contains permeable facies like coarse-grained sandstones and conglomerates that would provide the storage volume for ASR. The formation also contains abundant low permeability facies such as those tested in this study. These low permeability portions of the formation may likely act as baffles to groundwater flow. Additionally, the Fountain Formation is typically 800 to 1000 feet thick in most of the study area which would provide a large volume of rock for water storage.

The Fountain Formation also has some constraints that may be possible limitations for ASR use. In general, most of the wells completed in the Fountain have low yields and low specific capacities that would not be suitable for an ASR well. But most of these wells are household and domestic wells which were constructed for limited production. Another concern is that the Fountain may be hydraulically connected to surface waters. This could be a water rights issue that would make permitting for ASR more difficult in some areas. It may also prevent ASR use because the stored water would likely migrate to the stream and be discharged from the aquifer. The uncertainty of the effect of faults in the formation on groundwater flow in the aquifer may also be a concern. An additional limitation is the scarcity of data in some quadrangles which prevents an assessment of the aquifer in those areas using the methods in this study.

Based on the results of this study, there are certain areas of interest which may be better suited for ASR implementation in the Fountain Formation. The first areas of

interest are municipalities that extensively use the Fountain as a water source and have a few municipal wells in the formation. These areas include Lyons, Morrison, and Woodland Park. The second areas of interest are quadrangles where the Fountain aquifer is used relatively less and there are no municipal wells but there is good potential for ASR. These areas have wells with decent specific capacities, are where the Fountain Formation is at an optimal depth for ASR, and are near municipalities that could utilize ASR. The quadrangles meeting these conditions include Laporte, Horsetooth Reservoir, Carter Lake, Golden, Mount Pittsburg, Cheyenne Mountain, and Royal Gorge.

CHAPTER 7. CONCLUSIONS

The data collected in this study show that the Fountain Formation is used as a water source in Northern Colorado for multiple purposes including drinking water. The data provide an inventory of hydraulic characteristics from water wells completed in the formation and were used to calculate aquifer properties of the Fountain and maps of water levels in selected areas. This method of collecting data has provided a large quantity of hydraulic data across a large study area and could likely be used in other aquifers for similar purposes. In addition, the permeability of several outcrop samples was tested and the geology of the formation was described to aid in the assessment of ASR use of the Fountain. Based on the results of this study the following conclusions are made:

1. Yields from wells in the Fountain appear to mostly depend on well construction. Most wells were constructed for domestic and household use and have low yields and low specific capacities. In contrast, municipal and irrigation wells completed in the formation have high yields and specific capacities. Most of these wells have calculated specific capacities over 1 gpm/ft. With a specific capacity of 1 and a drawdown of 1000 feet a well would produce 1000 gpm. The presence of these wells suggests that the Fountain can produce high yields given the construction of municipal wells with large diameter casings, high capacity screens, and high capacity pumps.
2. The water level elevation maps produced in this study provide an approximation of the water levels in the Fountain Formation. These maps show that the general

direction of water flow is to the east or southeast for most of the study area. Where the formation changes strike to an east-west direction, the water flow direction is towards the south or southwest.

3. The data collected from air permeameter tests show that the well-cemented facies in the Fountain Formation do not vary much in permeability. The less cemented facies likely have much higher permeabilities.
4. The results of this study and the preceding conclusions suggest that the Fountain Formation is a feasible target for ASR implementation.
5. There are certain locations within the study area which may be better suited for ASR in the Fountain Formation. The first areas of interest are municipalities that extensively use the Fountain as a water source and include Lyons, Morrison, and Woodland Park. The second areas of interest are where the Fountain is at an optimal depth for ASR, is near existing infrastructure, and has wells with good specific capacities. The areas meeting these conditions include parts of the Laporte, Horsetooth Reservoir, Carter Lake, Golden, Mount Pittsburg, Cheyenne Mountain, and Royal Gorge quadrangles.
6. The next step for an ASR project in the Fountain Formation would be a test well drilling program. The program should include an aquifer test that would provide better information on local aquifer conditions. The test well could also provide core samples and water samples which would be used in geochemical analysis of interactions between the rock, formation water, and introduced water. This would be the best way to assess the feasibility of creating an ASR well field in a particular location.

REFERENCES

Antoniou, E.A., van Breukelen, B.M., Putters, B., and Stuyfzand, P.J., 2012, Hydrogeochemical patterns, processes and mass transfers during aquifer storage and recovery (ASR) in an anoxic sandy aquifer: Applied Geochemistry, v. 27, no. 12, p. 2435–2452, doi: 10.1016/j.apgeochem.2012.09.006.

Antoniou, E.A., Stuyfzand, P.J., and van Breukelen, B.M., 2013, Reactive transport modeling of an aquifer storage and recovery (ASR) pilot to assess long-term water quality improvements and potential solutions: Applied Geochemistry, v. 35, p. 173–186, doi: 10.1016/j.apgeochem.2013.04.009.

Barkmann, P.E., Fitzgerald, F.S., Sebol, L.A., Curtiss, W., Pike, J., Moore, A., and Taylor, B., 2015, Geology and Groundwater Resources of Douglas County: Colorado Geological Survey, p. 40.

Bhuiyan, C., 2015, An approach towards site selection for water banking in unconfined aquifers through artificial recharge: Journal of Hydrology, v. 523, p. 465–474, doi: 10.1016/j.jhydrol.2015.01.052.

Braddock, W.A., Calvert, R.H., O'Connor, J.T., and Swann, G.A., 1989, Geologic Map of the Horsetooth Reservoir Quadrangle, Larimer County, Colorado: Washington, D.C., U.S. Geological Survey, 1:24,000.

Braddock, W.A., Connor, J.J., Swann, G.A., and Wohlford, D.D., 1988, Geologic Map of the Laporte Quadrangle, Larimer County, Colorado: Washington, D.C., U.S. Geological Survey, 1:24,000.

Brooks, R.H., and Corey, A.T., 1964, Hydraulic Properties of Porous Media: Hydrology Papers, Colorado State University, v. 3, p. 30.

Burns, A.W., 1984, Simulated effects of an artificial-recharge experiment near Proctor, Logan County, Colorado: U.S. Geological Survey Water-Resources Investigations Report 84-4010, p. 40.

Butters, R.M., 1913, Permian or "Permo-Carboniferous" of the eastern foothills of the Rocky Mountains in Colorado: Colorado Geological Survey, , no. 5, p. 65–94.

Carsrud, C.T., Sweet, D.E., and Watters, A.J., 2013, A Pennsylvanian age for the Fountain Formation constrained by lithologic comparison of overlying eolian units: Abstracts with Programs - Geological Society of America, v. 45, no. 3, p. 13.

Condie, K.C., Dengate, J., and Cullers, R.L., 1995, Behavior of rare earth elements in a paleoweathering profile on granodiorite in the Front Range, Colorado, USA: Geochimica et Cosmochimica Acta, v. 59, no. 2, p. 279–294, doi: 10.1016/0016-7037(94)00280-Y.

Cross, W., 1894, Pikes Peak folio, Colorado, with a description of Cripple Creek special

map by R.A.F. Penrose, Jr.: U.S. Geological Survey Geologic Atlas of the United States Folio, GF-7, p. 7.

Cullers, R.L., and Stone, J., 1991, Chemical and mineralogical comparison of the Pennsylvanian Fountain Formation, Colorado, U.S.A. (an uplifted continental block) to sedimentary rocks from other tectonic environments: Lithos, v. 27, no. 2, p. 115–131, doi: 10.1016/0024-4937(91)90024-F.

Davis, R.W., 1984, Hydrodynamics of the Fountain and Casper Formations, Laramie Basin, Wyoming: Earth Science Bulletin, p. 113.

Dickinson, W.R., and Lawton, T.F., 2003, Sequential intercontinental suturing as the ultimate control for Pennsylvanian Ancestral Rocky Mountains deformation: Geology, v. 31, no. 7, p. 609–612, doi: 10.1130/0091-7613(2003)031<0609:SISATU>2.0.CO;2.

El-Banna, M.M., 1993, Paleosols, provenance, and diagenesis of the Fountain Formation, NE Colorado and SE Wyoming: Colorado State University, 266 p.

Elewa, H.H., Fathy, R.G., and Qaddah, A.A., 2010, The contribution of geographic information systems and remote sensing in determining priority areas for hydrogeological development, Darb el-Arbain area, Western Desert, Egypt: Hydrogeology Journal, v. 18, no. 5, p. 1157–1171, doi: 10.1007/s10040-010-0590-4.

Emmons, P.J., 1977, Artificial-recharge tests in upper Black Squirrel Creek Basin, Jimmy Camp Valley, and Fountain Valley, El Paso County, Colorado: U.S. Geological Survey Water-Resources Investigations Report 77-11, p. 49.

EPA, 2012, Aquifer recharge (AR) and aquifer storage & recovery (ASR): http://water.epa.gov/type/groundwater/uic/aquiferrecharge.cfm,.

Finlay, G.I., 1907, The Gleneyrie Formation and its Bearing on the Age of the Fountain Formation in the Manitou Springs Region, Colorado: The Journal of Geology, v. 15, no. 6, p. 586–589.

Frederickson, E.A., De Lay, J.M., and Saylor, W.W., 1956, Ralston formation of Canon City embayment, Colorado: AAPG Bulletin, v. 40, no. 9, p. 2120–2148.

Hogan, I.M., and Sutton, S.J., 2014, The Role of Mudstone Baffles In Controlling Fluid Pathways In A Fluvial Sandstone: A Study In the Pennsylvanian-Permian Fountain Formation, Northern Colorado, U.S.A: Journal of Sedimentary Research, v. 84, no. 11, p. 1064–1078, doi: 10.2110/jsr.2014.81.

Howard, J.D., 1966, Patterns of sediment dispersal in the Fountain Formation of Colorado: The Mountain Geologist, v. 3, no. 4, p. 147–153.

Hubert, J.F., 1960, Syngenetic Bleached Borders on Detrital Red Beds of the Fountain Formation, Front Range, Colorado: Geological Society of America Bulletin, v. 71, no. 1, p. 95, doi: 10.1130/0016-7606(1960)71[95:SBBODR]2.0.CO;2.

Huntoon, P.W., and Lundy, D.A., 1979, Fracture-Controlled Ground-Water Circulation

and Well Siting in the Vicinity of Laramie, Wyoming: Ground Water, v. 17, no. 5, p. 463–469.

Jennings, J.R., 1980, Fossil Plants from the Fountain Formation (Pennsylvanian) of Colorado: Journal of Paleontology, v. 54, no. 1, p. 149–158.

Van de Kamp, P.C., and Leake, B.E., 1994, Petrology, geochemistry, provenance, and alteration of Pennsylvanian-Permian arkose, Colorado and Utah: Geological Society Of America Bulletin, v. 105, p. 1571–1582.

Keller, J.W., Siddoway, C., Morgan, M.L., Route, E.E., Grizzell, M.T., Sacerdoti, R., and Stevenson, A., 2003, Geologic Map of the Manitou Springs Quadrangle, El Paso and Teller Counties, Colorado: Denver, CO, Colorado Geological Survey, 1:24,000.

Khan, S., Mushtaq, S., Hanjra, M.A., and Schaeffer, J., 2008, Estimating potential costs and gains from an aquifer storage and recovery program in Australia: Agricultural Water Management, v. 95, no. 4, p. 477–488, doi: 10.1016/j.agwat.2007.12.002.

Kluth, C.F., and Coney, P.J., 1981, Geology Plate tectonics of the Ancestral Rocky Mountains: Geology, v. 9, no. 1, p. 10–15, doi: 10.1130/0091-7613(1981)9<10.

Knight, S.H., 1929, The Fountain and the Casper Formations of the Laramie Basin; a Study on Genesis of Sediments: Wyoming Univ. Pub. Sci. Geology, v. 1, no. 1, p. 1–48.

Leonard, G.J., 1984, Assessment of Water Resources at Fort Carson Military Reservation near Colorado Springs, Colorado: Water-Resources Investigations Report 83-4270, U.S. Geological Survey, p. 84.

Littleton, R.T., 1950, Reconnasissance of the geology and ground-water hydrology of the Laramie Basin, Wyoming: U.S. Geological Survey, Washington, D.C.

Mack, G.H., and Suttner, L.J., 1977, Paleoclimate Interpretation from a Petrographic Comparison of Holocene Sands and the Fountain Formation (Pennsylvanian) in the Colorado Front Range: Journal of Sedimentary Petrology, v. 47, no. 1, p. 89–100.

Maples, C.G., and Suttner, L.J., 1990, Trace Fossils and Marine-Nonmarine Cyclicity in the Fountain Formation (Pennsylvanian: Morrowan/Atokan) Near Manitou Springs , Colorado: Journal of Paleontology, v. 64, no. 6, p. 859–880.

Mclaughlin, K.P., 1947, Pennsylvanian Stratigraphy of the Colorado Springs Quadrangle , Colorado.: Louisiana State University and Agricultural & Mechanical College, p. 174.

McWhorter, D.B., 1984, Specific Yield by Geophysical Logging Potential for the Denver Basin: Colorado State University, Reserach Project Technical Completion Report, , no. 132.

Ver Ploeg, A.J., and Boyd, C.S., 2007, Geologic map of the Laramie 30’ x 60’ Quadrangle, Albany and Laramie Counties, Southeastern Wyoming: Wyoming State Geological Survey, 1:100,000.

Pyne, R.D.G., 2005, Aquifer Storage Recovery: A Guide to Groundwater Recharge Through Wells: ASR Systems LLC, Gainesville, FL.

Robson, S.G., and Banta, E.R., 1987, Geology and hydrology of the deep bedrock aquifers in eastern Colorado: U.S. Geological Survey Water-Resources Investigations Report 85-4240, p. 6.

SJRWMD, and Pyne, R.D.G., 2004, Aquifer Storage and Recovery (ASR) Issues and Concepts: Water Management, p. 34.

Soreghan, G.S., Keller, G.R., Gilbert, M.C., Chase, C.G., and Sweet, D.E., 2012, Load-induced subsidence of the Ancestral Rocky Mountains recorded by preservation of Permian landscapes: Geosphere, v. 8, no. 3, p. 654–668.

Sterrett, R.J., 2007, Groundwater & Wells: Johnson Screens, New Brighton, MN.

Suttner, L.J., and Dutta, P.K., 1986, Alluvial sandstone composition and paleoclimate, I. Framework mineralogy: Journal of Sedimentary Petrology, v. 56, p. 329–345, doi: 10.1306/212F8909-2B24-11D7-8648000102C1865D.

Suttner, L.J., Langford, R., and Schultz, A., 1984, Sedimentology of the Fountain Fan-Delta Complex near Manitou Springs and Canon City, Colorado: SEPM, Tulsa, OK.

Sweet, D.E., Carsrud, C.R., and Watters, A.J., 2015, Proposing an Entirely Pennsylvanian Age for the Fountain Formation through New Lithostratigraphic Correlation along the Front Range 1: The Mountain Geologist, v. 52, no. 2, p. 43–70.

Sweet, D.E., and Soreghan, G.S., 2010, Application of Quartz Sand Microtextural Analysis to Infer Cold-Climate Weathering for the Equatorial Fountain Formation (Pennsylvanian-Permian, Colorado, U.S.A.): Journal of Sedimentary Research, v. 80, no. 7, p. 666–677, doi: 10.2110/jsr.2010.061.

Sweet, D.E., and Soreghan, G.S., 2009, Late Paleozoic tectonics and paleogeography of the ancestral Front Range: Structural, stratigraphic, and sedimentologic evidence from the Fountain Formation (Manitou Springs, Colorado): Geological Society of America Bulletin, , no. 3, p. 575–594, doi: 10.1130/b26554.1.

Sweet, D.E., and Soreghan, G.S., 2008, Polygonal cracking in coarse clastics records cold temperatures in the equatorial Fountain Formation (Pennsylvanian-Permian, Colorado): Palaeogeography, Palaeoclimatology, Palaeoecology, v. 268, no. 3–4, p. 193–204, doi: 10.1016/j.palaeo.2008.03.046.

Tieje, A.J., 1923, The Red Beds of the Front Range in Colorado: A Study in Sedimentation: The Journal of Geology, v. 31, no. 3, p. 199–207.

Topper, R., Barkmann, P.E., Bird, D.A., and Sares, M.A., 2004, Artificial recharge of ground water in Colorado - A Statewide Assessment: Environmental Geology, v. 13, p. 1–158, doi: 10.1007/BF01705125.

Wahlstrom, E.E., 1948, Pre-Fountain and Recent Weathering on Flagstaff Mountain near Boulder, Colorado: Bulletin of the Geological Society of America, v. 59, p.

1173–1190.

Walker, T.R., 1967, Formation of red beds in modern and ancient deserts: Bulletin of the Geological Society of America, v. 78, no. 3, p. 353–368, doi: 10.1130/0016-7606(1967)78[353:FORBIM]2.0.CO;2.

Ward, J.D., Simmons, C.T., and Dillon, P.J., 2008, Variable-density modelling of multiple-cycle aquifer storage and recovery (ASR): Importance of anisotropy and layered heterogeneity in brackish aquifers: Journal of Hydrology, v. 356, no. 1–2, p. 93–105, doi: 10.1016/j.jhydrol.2008.04.012.

Weeks, E.P., 2002, A Historical Overview of Hydrologic Studies of Artificial Recharge in the U.S. Geological Survey: U.S. Geological Survey Artificial Recharge Workshop Proceedings, p. 2–4.

APPENDIX

AIR PERMEAMETER OPERATING INSTRUCTIONS

1. Turn on air supply at wall. Set regulator closest to wall so that the gauge reads 5-7 lbs. of pressure.
2. Make sure that the left valve of tank A (top tank) is closed and that the right valves are open. The valves at the vacuum pump need to be closed too.
3. Turn on vacuum pump via light switch to the right of the instrument. Build up a vacuum pressure greater than 15 psi. After the pressure is built up open the left valve of tank A. Also make sure valve #6 is open. The right side of tank can be closed off now and the vacuum pump turned off if needed.
4. Unhook sample chamber from manometer by disconnecting the tube from the 3-way valve to the right side of the manometer.
5. Make sure sample chamber is depressurized by checking that the top piece can move freely.
6. Measure the length and diameter of the sample several times with a caliper.
7. Place sample in chamber.
8. Check that the pressure blowing through the 3-way valve towards the manometer is not excessive. This can be adjusted using the pressure regulator valve (#2). Then reconnect the tube from the manometer to the 3-way valve.
9. Equilibrate the manometer using valve #2 to get a Δh roughly equivalent to the length of the sample.
10. Put a soap bubble in the bubble chamber:
    a. Make sure valve #3 is pointing correct direction (NW-SW orientation for the right side tube, opposite orientation for left tube). Use the left tube for less permeable samples.
    b. Make sure valve #4 is closed so that flow goes to the manometer but not the soap chamber.
    c. Open valve #5. Let soap into the chamber by lifting the soap holder up.
    d. Wet the entire tube and slowly bring soap back down to the bottom.
    e. Hold soap at an even level and switch valve #3 to the other side.
    f. Soap bubble should enter tube.
    g. Close valve #5, switch valve #3 back, and put soap back.
    h. This step may require moving the soap up and down a bit to get a bubble moving later in step 16.
11. Now we need to pressurize the rubber around the sample. Close valve #6 and make sure valve #7 is closed too.
12. Open the compressed air tank (valve #8) and set it to about 80 psi.
13. WHILE HOLDING THE TOP OF THE SAMPLE CHAMBER, open valve #7 to seal in the sample.

14. Set a Δh roughly equivalent to the length of the sample using valve #2.
15. Set bubble in motion by opening valve #4. If bubble is not moving, open #5 and move soap up/down to get bubbles.
16. Record the time it takes for the bubble to move a certain volume with a stopwatch. Also record the change in head on the manometer.
17. Record lots of measurements.
18. Changing the direction of valve #3 will make the bubble move in the opposite direction. Closing valve #4 will stop the bubbles.

SHUT DOWN INSTRUCTIONS

1. Turn off flow to the bubble chamber (close valve #4).
2. Unhook tubing from sample (3-way valve) to manometer.
3. Close valve #7.
4. Open valve #6 to vacuum.
5. Check that top of sample chamber can move.
6. Remove sample from chamber.
7. Turn off compressed air (#8).
8. Bleed compressed air to vacuum by opening valve #7.
9. Turn off air supply at wall.
10. Open valves on right side of tank A to bleed tank.
11. Make sure vacuum pump is off and valves at the pump are open.
12. Close regulator valve (#2) to return manometer head to zero.

AQUAMAP DATA

Permit	UTM_x	UTM_y	County	Description	Well type	Yield (GPM)	TD (feet)	static water level (feet)	pumping level
260392	477788.1	4526549	Larimer	Red Mountain	Domestic	1.5	600	60	600
30973	477596.7	4527298	Larimer	Red Mountain	Domestic	1	120	90	100
200694	476917.8	4526244	Larimer	Red Mountain	Domestic	7.5	500	17	480
202244	477111.5	4526779	Larimer	Red Mountain	Domestic	8.5	350	40	330
286458	475785	4527483	Larimer	Red Mountain	Stock	0.5	400	12	400
199825	478738.3	4527255	Larimer	Red Mountain	Domestic	7	400	185	380
163182	478927.5	4527550	Larimer	Red Mountain	Domestic	7	380	80	362
295745	475297	4529504	Larimer	Red Mountain	Domestic	12	580	78	580
244878	475525	4529738	Larimer	Red Mountain	Domestic	3	540	90	540
233015	475616.7	4530505	Larimer	Red Mountain	Domestic	3.5	365	65	260
266113	474207.6	4530201	Larimer	Red Mountain	Domestic	8.9	400	45	360
238723	474815.8	4531085	Larimer	Red Mountain	Domestic	8	280	112	160
186494	472495.5	4530038	Larimer	Logan Ranch	Domestic	5.5	440	25	420
276600	474060.2	4532025	Larimer	Red Mountain	Stock	4	640	96	300
163182	478927.5	4527550.4	Larimer	S Table Mountain	Stock	7	380	80	362
180879	481624.5	4532016	Larimer	W Table Mountain	Domestic	4	400	19	380
176251	485032.1	4511313.4	Larimer	S Livermore	Domestic	0.5	400	40	400
150293	484475.7	4511412.5	Larimer	S Livermore	Domestic	41	600	20	600
150960	483982.8	4511480.5	Larimer	S Livermore	Domestic	15	200	8	200
148227	483972	4511459	Larimer	S Livermore	Domestic	8	98	35	45
150964	483746.7	4511216.4	Larimer	S Livermore	Domestic				
144003	483956.7	4511754.9	Larimer	S Livermore	Stock	3	160	15	160
183139	483775.5	4511939	Larimer	S Livermore	Domestic				
272137	483548	4512102	Larimer	S Livermore	Domestic		500		
270287	484488	4511986	Larimer	S Livermore	Stock	5	740	280	600
295801	484471	4512068	Larimer	S Livermore	Stock	10	600	130	500
293617	483686.2	4512565	Larimer	S Livermore	Stock		800		
234174	483785.8	4513012.5	Larimer	S Livermore	Domestic		380		
74127	484000	4513090.5	Larimer	S Livermore	Household	5	140	30	140
148765	483704.5	4513485.5	Larimer	S Livermore	Domestic		640	40	
213944	483714.7	4514149.5	Larimer	S Livermore	Domestic		300	13	
257601	483655.2	4514411.5	Larimer	S Livermore	Domestic		400	10	
78183	484264.3	4515400.6	Larimer	E Livermore	Other	7	675	108	428
8334	482565.4	4515792.1	Larimer	E Livermore	Domestic	2	164	20	164
85292	481686.9	4515620.6	Larimer	Livermore	Household	1	250	20	250
217928	481567.5	4515585.1	Larimer	Livermore	Domestic	14	240	95	240
91933	481715.4	4515943	Larimer	Livermore	Household	1	495	30	495
94831	481702.4	4516034.5	Larimer	Livermore	Stock	20	145	35	145
262616	481778.7	4515828	Larimer	Livermore	Household	7	740	20	740

235940	481437.4	4515854.1	Larimer	Livermore	Other	10	260	28	240
107128	481315.7	4515995.1	Larimer	Livermore	Commercial	3.5	200	48	187
51771	481212.2	4515872.1	Larimer	Livermore	Domestic	4	190	130	180
283259	480371	4515594	Larimer	Livermore	Household	7	400	40	380
141267	479187	4514945	Larimer	Livermore	Domestic	7.5	210	64	200
8276	478845.2	4524748.3	Larimer	NW Livermore	Domestic	18	36	14	20
9164	478845.2	4524748.3	Larimer	NW Livermore	Stock	15	43	15	16
9164	478845.2	4524748	Larimer	S Red Mountain	Stock	15	43	15	43
283987	476358	4520349	Larimer	North Fork Poudre	Domestic	10	300	2	300
29717	476503.6	4519407	Larimer	North Fork Poudre	Domestic	20	26	5	17
296105	476355	4519305	Larimer	North Fork Poudre	Commercial	10	500	0	420
160969	477116.6	4519223	Larimer	North Fork Poudre	Domestic	7	105	51	95
170533	477740.4	4519349	Larimer	North Fork Poudre	Domestic	7	560	10	543
55	475065.2	4518813	Larimer	Rabbit Creek		1.5	185	23	180
164994	477441.4	4518543	Larimer	North Fork Poudre	Domestic	12	200	12	200
17799	477731.9	4518637	Larimer	North Fork Poudre	Domestic	7	51	19	34
198077	478558.8	4517827	Larimer	Stonewall Creek	Domestic	7	150	38	148
71735	477835.4	4517268	Larimer	North Fork Poudre	Domestic Stock	4	105	13	97
67132	474541.1	4515987	Larimer	Lone Pine Creek	Stock	10	60	14	39
78266	474490.3	4515790	Larimer	Lone Pine Creek	Domestic	10	30	11	21
184337	474693.9	4515300	Larimer	Lone Pine Creek	Stock	12	300	0	NA
178854	476434.3	4516183	Larimer	Lone Pine Creek	Domestic	0.75	260	10	260
78827	477381	4515504	Larimer	Lone Pine Creek	Household	1.3	470	40	470
286	478363	4515068	Larimer	W Livermore	Domestic	1	65	18	65
6153	484099.2	4497449	Larimer	Ted's Place	Domestic	10	60	34	40
12914	485297	4499044	Larimer	Ted's Place	Domestic	10	66	32	44
14240	485703.8	4497845	Larimer	Ted's Place	Domestic	5	50	22	45
38725	485515.4	4498827	Larimer	Ted's Place	Domestic	15	35	10	13
49498	481695.9	4503035	Larimer	Ted's Place	Domestic	0.5	210	30	210
54392	482467.8	4503463	Larimer	Ted's Place	Domestic Stock	4	275	35	235
54483	482077.7	4503460	Larimer	Ted's Place	Domestic	NA	215	NA	NA
66537	482152.2	4503481	Larimer	Ted's Place	Domestic Stock	15	200	30	160
66857	482113.5	4503565	Larimer	Ted's Place	Household	6.4	300	61	280
68477	482068.8	4503420	Larimer	Ted's Place	Other	20	60	15	40
74367	481660.1	4503126	Larimer	Ted's Place	Domestic	0.3	420	28	420

79953	482260.7	4503802	Larimer	Ted's Place	Household	1	540	125	500
81972	484548.2	4508890	Larimer	S Livermore	Domestic	9	175	28	175
82877	481632	4503963	Larimer	Ted's Place	Domestic	7	295	18	295
82878	481938.9	4502460	Larimer	Ted's Place	Household	7.5	235	75	150
82878	481063.6	########	Larimer	Ted's Place	Household	1.5	580	200	580
87232	481811.4	4503234	Larimer	Ted's Place	Household	2	220	35	215
98764	484496.6	4509498	Larimer	S Livermore	Domestic	6	650	32	650
104253	482516.1	4502573	Larimer	Ted's Place	Domestic	4	210	80	210
126822	484089.8	4510587	Larimer	S Livermore	Domestic	1.5	308	40	308
140795	484021.5	4497398	Larimer	Ted's Place	Household	2	200	32	133
146329	484505.3	4510992	Larimer	S Livermore	Domestic	15	83	37	80
154316	482093.6	4502492	Larimer	Ted's Place	Household	15	280	60	187
161691	482262	4502750	Larimer	Ted's Place	Household	5	100	43	90
172737	485876.6	4497987	Larimer	Ted's Place	Domestic	5	325	175	320
174441	484455.5	4510577	Larimer	S Livermore	Domestic	1	500	62	480
177156	484460.2	4510196	Larimer	S Livermore	Domestic	8	300	20	280
186079	482169.1	4501799	Larimer	Ted's Place	Household	10	200	36	200
193763	484461	4509693	Larimer	S Livermore	Domestic	4.8	500	10	480
201569	482243.1	4502386	Larimer	Ted's Place	Domestic	0.5	535	43	400
203081	484217.1	4510137	Larimer	S Livermore	Domestic	4.4	400	30	380
219827	484218.7	4509969	Larimer	S Livermore	Domestic Stock	8	200	42	200
264990	484862.6	4499047	Larimer	Ted's Place	Domestic	47	80	15	25
274739	485947	4499329	Larimer	Ted's Place	Household	14.5	400	175	400
293656	482157	4501317	Larimer	Ted's Place	Monitoring	75	56	12	13.4
297041	481999	4503453	Larimer	Ted's Place	Household	10	1000	100	1000
7101	485581.2	4486043	Larimer	W Fort Collins	Domestic	1	100	80	100
33910	485586.9	4485637	Larimer	W Fort Collins	Domestic	5	280	21	301
40219	483970.4	4485702	Larimer	W Fort Collins	Domestic	0.75	600	40	600
84870	486155.4	4486422	Larimer	W Fort Collins	Household	2	125	120	125
127375	485830.9	4484734	Larimer	W Fort Collins	Household	1	600	7	500
133996	483573.8	4483621	Larimer	W Fort Collins	Domestic	0.5	740	400	740
139845	482990.7	4485903	Larimer	W Fort Collins	Household	6	260	20	260
141782	483224.9	4483192	Larimer	W Fort Collins	Domestic	0.6	540	40	540
151133	484456.9	4485730	Larimer	W Fort Collins	Domestic Stock	3	440	30	440
153763	486725.5	4487104	Larimer	W Fort Collins	Domestic Stock	6	640	176	498
161546	484264.4	449153.8	Larimer	W Fort Collins	Domestic	4	750	90	750
163138	483828	4484130	Larimer	W Fort Collins	Domestic	5	800	49	724
164247	483725.4	4483409	Larimer	W Fort Collins	Domestic	10	300	6	285
166498	484620.7	########	Larimer	W Fort Collins	Domestic	7.5	480	145	480
167578	485738.8	4483771	Larimer	W Fort Collins	Domestic	10	360	36	343
169122	483878.8	4483823	Larimer	W Fort Collins	Domestic	0.5	720	89	640
169783	484199	4484709	Larimer	W Fort Collins	Domestic	0.17	860	860	860

173825	484079.9	4493204	Larimer	W Fort Collins	Household	7	380	120	360
178157	484103.1	4484195	Larimer	W Fort Collins	Domestic	1.5	300	8	300
184958	484241.4	4484904	Larimer	W Fort Collins	Domestic	4.2	700	36	660
198833	483976.6	4485519	Larimer	W Fort Collins	Domestic	13.9	200	10	180
201345	484012	4483838	Larimer	W Fort Collins	Domestic Stock	7.3	600	243	600
214349	485744	4483923	Larimer	W Fort Collins	Domestic	10	500	10	500
214931	484354.8	4484261	Larimer	W Fort Collins	Domestic	0.45	680	120	680
227611	483106.9	4484669	Larimer	W Fort Collins	Domestic	2	700	300	700
252234	486202.2	4486514	Larimer	W Fort Collins	Domestic	0.5	480	438	480
267206	485888	4483323	Larimer	W Fort Collins	Domestic Stock	50	400	5	400
204366	483984.5	4483605	Larimer	W Fort Collins	Domestic	15	260	47	260
159296	483899.1	4483327	Larimer	W Fort Collins	Domestic	0.5	500	137	500
156209	482229.6	4486717	Larimer	W Fort Collins	Domestic	3	600	60	580
112675	481928.9	4487008	Larimer	W Fort Collins	Domestic	4	500	70	490
135305	481813.2	4487206	Larimer	W Fort Collins	Domestic	15	260	12	260
133657	481696.2	4487736	Larimer	W Fort Collins	Domestic	1	340	40	330
164264	481696.2	4487911	Larimer	W Fort Collins	Domestic	7	220	7	182
157712	481905.4	4488131	Larimer	W Fort Collins	Household	15	355	190	240
183812	481601.5	4488721	Larimer	W Fort Collins	Domestic	1.5	400	32	380
161383	481222.4	4489360	Larimer	W Fort Collins	Domestic	5	250	65	235
173338	480666.5	4489480	Larimer	W Fort Collins	Domestic	7.5	300	25	280
173370	480333.1	4489602	Larimer	W Fort Collins	Domestic	2	400	18	400
231105	480871.4	4489920	Larimer	W Fort Collins	Domestic	7.5	680	10	453
17758	480412	4490022	Larimer	W Fort Collins	Domestic	4	65	18	43
200643	480277.1	4489921	Larimer	W Fort Collins	Domestic	1.2	500	10	480
271821	479862	4490187	Larimer	W Fort Collins	Domestic Stock	7.2	700	10	466
172804	479918.4	4490378	Larimer	W Fort Collins	Domestic	0.2	400	11	400
160924	480405.8	4490363	Larimer	W Fort Collins	Domestic	5	800	440	685
160924	480406.1	4490378	Larimer	W Fort Collins	Domestic	0.5	300	35	285
171989	480833.3	4490408	Larimer	W Fort Collins	Domestic	0.17	400	19	382
171836	480820.4	4490819	Larimer	W Fort Collins	Domestic	4	380	80	380
169784	480348.1	4490805	Larimer	W Fort Collins	Domestic	5	400	10	380
181643	480056.4	4491262	Larimer	W Fort Collins	Domestic	10	285	15	20
184664	479733.7	4491353	Larimer	W Fort Collins	Domestic	0.46	500	80	500
186271	480468.7	4491079	Larimer	W Fort Collins	Domestic	15	380	15	360
241992	480227.3	4483937	Larimer	W Fort Collins	Household	7	300	120	280
197357	479895.4	4483707	Larimer	W Fort Collins	Domestic	4	200	13	180
117779	479217.2	4483982	Larimer	W Fort Collins	Domestic	1	300	25	300
277609	479292.8	4484118	Larimer	W Fort Collins	Commercial	1	300	25	300
216144	479112.5	4484219	Larimer	W Fort Collins	Domestic	0.66	600	200	600
278065	478831	4484537	Larimer	W Fort Collins	Domestic Stock	10	150	23	100

278064	478891	4484608	Larimer	W Fort Collins	Domestic Stock	12	30		
241270	478820.5	4484633	Larimer	W Fort Collins	Domestic	1	700	5	700
268890	478886	4484895	Larimer	W Fort Collins	Domestic	14.8	580	3	580
244242	478955	4485073	Larimer	W Fort Collins	Domestic	14.7	740	210	250
127375	485830.9	4484734	Larimer	W Fort Collins	Household	6	400	5	400
133372	483805.1	4494857	Larimer	W Fort Collins	Domestic	5	230	24	230
144204	483675.6	4495663	Larimer	W Fort Collins	Household	5	143	5	140
218411	478698.8	4485097	Larimer	Buckhorn Mountain	Domestic Stock	9	440	2	440
211309	478360.6	4485092	Larimer	Buckhorn Mountain	Domestic	1.6	300	28	300
138030	478284.4	4485091	Larimer	Buckhorn Mountain	Domestic	3	680	70	680
143423	478439	4484732	Larimer	Buckhorn Mountain	Domestic	0.83	660	100	660
179189	478419.2	4484487	Larimer	Buckhorn Mountain	Domestic	0.25	620	29	620
78213	478525.2	4485582	Larimer	Buckhorn Mountain	Household	3	95	23	95
190311	477989.8	4486001	Larimer	Buckhorn Mountain	Domestic	0.17	500	148	500
248178	477853.6	4486060	Larimer	Buckhorn Mountain	Domestic	5	600	280	580
141782	483224.9	4483191.5	Larimer	NE Masonville	Domestic	0.6	540	40	540
141792	483645.3	4483020	Larimer	NE Masonville	Domestic	0.75	500	25	485
141939	483304.1	4482828.5	Larimer	NE Masonville	Domestic	10	260	35	260
167358	483264	4482492.6	Larimer	NE Masonville	Domestic	7	300	5	280
155723	483176.6	4482338.1	Larimer	NE Masonville	Domestic	6	380	40	350
147391	483878.3	4481416.1	Larimer	E Masonville	Domestic	10	500	62	500
201982	480801.4	4482495.7	Larimer	NW Masonville	Domestic	5.8	315	50	295
243837	480748.8	4482313.2	Larimer	NW Masonville	Domestic	7	560	90	540
52862	480728.2	4481622.2	Larimer	W Masonville	Domestic	3	340	40	335
266248	480837	4481276	Larimer	W Masonville	Domestic	5	200	NA	NA
268931	480918.3	4481148	Larimer	W Masonville	Stock	3	560	17	440
221566	481437.6	4480962.2	Larimer	SW Masonville	Domestic	10	380	18	253
259990	481356.3	4480424	Larimer	SW Masonville	Domestic	15	600	142	490
219029	481430.3	4478817.1	Larimer	SW Masonville	Domestic	12	560	2	560
276869	480415.4	4482343.5	Larimer	NW Masonville	Commercial	3	120	12	50
247508	480465.7	4480565	Larimer	SW Masonville	Household	15	500	20	415
61069	481237.3	4477600	Larimer	Big Thompson	Commercial	40	500	90	190
70578	481439.8	4476935.5	Larimer	Big Thompson	Household	100	170	NA	170
47785	481405.1	4476809.1	Larimer	Big Thompson	Domestic	2	140	35	139
83092	482584.5	4474454.6	Larimer	Big Thompson	Household	6	215	30	215
258756	482693.3	4474136.5	Larimer	Big Thompson	Domestic	15	165	75	120
23114	482627.9	4474405.1	Larimer	Big Thompson	Domestic	10	80	NA	NA
10723	482609.3	4475212.6	Larimer	Big Thompson	Domestic	2	130	115	130

8686	480985.3	4474786.6	Larimer	Big Thompson	Domestic	8	40	30	40
41466	480985.3	4474786.6	Larimer	Big Thompson	Domestic	3	90	15	90
8686	481149.3	4474612.6	Larimer	Big Thompson	Domestic	0.2	440	20	440
157789	481051.4	4474594.6	Larimer	Big Thompson				NA	NA
86126	481211.7	4474461.5	Larimer	Big Thompson	Domestic	2	180	10	180
189454	481831.9	4471883.6	Larimer	Big Thompson				NA	NA
172066	481968.9	4471134.1	Larimer	Big Thompson	Household	5	460	90	420
172066	481968.9	4471152.6	Larimer	Big Thompson	Household	3	760	200	760
187123	481663.9	4470938.1	Larimer	Big Thompson	Domestic	4	540	10	520
210076	481724.5	4470366.5	Larimer	Big Thompson	Domestic	8	560	31	480
178580	481556.7	4470216.1	Larimer	Big Thompson	Domestic	14	400	10	380
243264	481444.5	4470128.1	Larimer	Big Thompson	Domestic	5	450	5	430
250696	482008.5	4470073.1	Larimer	Big Thompson	Domestic	5	680	60	660
40870	482233.2	4469957.1	Larimer	Big Thompson	Domestic	5	70	35	70
40872	482233.2	4469957.1	Larimer	Big Thompson	Domestic	15	65	30	65
222746	482090.8	4471092.1	Larimer	Big Thompson	Domestic	10	500	150	333
173033	487516.7	4480186.1	Larimer	E Masonville	Domestic	5	800	350	780
192087	487508.1	4479898.6	Larimer	E Masonville	Domestic	1.5	700	205	700
200899	487552.6	4479683.1	Larimer	E Masonville	Domestic	5	500	125	480
251158	486698.5	4477159.5	Larimer	E Masonville	Stock	3.5	500	35	500
230065	486531.3	4476835.6	Larimer	E Masonville	Domestic	7	600	80	580
10168	486335.9	4476830.6	Larimer	E Masonville	Domestic	1	285	220	285
217720	486531.8	4476530.6	Larimer	E Masonville	Domestic	8	640	105	640
217721	486501.7	4476256.6	Larimer	E Masonville	Domestic	7.5	400	77	400
176493	481062.3	4469063.6	Larimer	Flatiron Mountain	Domestic	3	400	20	380
237991	480820.8	4468488.6	Larimer	Flatiron Mountain	Domestic	5	775	88	755
230771	480779	4468113.1	Larimer	Flatiron Mountain	Domestic	9	600	60	510
297060	481737	4468029	Larimer	Flatiron Mountain	Domestic			100	NA
10726	481800.3	4467565.5	Larimer	Flatiron Mountain	Domestic	10	565	250	320
89127	480759.8	4467790.5	Larimer	Flatiron Mountain	Household	3	620	300	600
67281	480845.5	4467764	Larimer	Flatiron Mountain	Household	8	535	70	535
207267	480469.8	4467438.6	Larimer	Flatiron Mountain	Domestic	7	560	360	540
200170	480367.8	4466949.5	Larimer	Flatiron Mountain	Domestic	1	600	380	600
200170	480399.1	4466978	Larimer	Flatiron Mountain	Stock	6	1102	250	1028
221854	480420.5	4466794.1	Larimer	Flatiron Mountain	Domestic	5	660	336	570
292078	480824.9	4466874.5	Larimer	Carter Lake	Household	16	401	280	380
267839	480792.7	4466731	Larimer	Carter Lake	Household	50	400	140	288
177301	480314.8	4466186.5	Larimer	Carter Lake	Domestic	7	540	150	520
124643	480035.7	4464697.5	Larimer	Carter Lake	Other	35	350	76	350

214203	480818.8	4462736.5	Larimer	Carter Lake	Household	100.6	445	77	445
259203	480626.7	4463058.5	Larimer	Carter Lake	Household	10	460	65	306
192243	480935	4462360	Larimer	Carter Lake	Commercial		401	60	NA
11095	480315.2	4461430.5	Larimer	Carter Lake	Domestic	4	260	150	200
193852	479633	4461570	Larimer	Carter Lake	Domestic	4	480	25	447
168188	480035.2	4460930.5	Larimer	S Carter Lake	Domestic	3.3	280	28	280
144326	480578.5	4461525	Larimer	Carter Lake	Household	41	500	210	500
148662	480561.7	4461433.5	Larimer	Carter Lake	Household	20	460	116	460
248345	480573.7	4461113.5	Larimer	Carter Lake	Household	20	520	370	520
225628	480631.7	4461586	Larimer	Carter Lake	Household	70	500	200	500
162579	480637.9	4461578.5	Larimer	Carter Lake	Household	30	500	180	500
224127	480632.4	4461471.5	Larimer	Carter Lake	Household	35	520	293	520
292829	480651.1	4461363	Larimer	Carter Lake	Household	10	540	235	540
240272	480716.6	4461418.5	Larimer	Carter Lake	Household	15	480	130	480
244821	480756.2	4461174.5	Larimer	Carter Lake	Household	40	400	360	400
244820	480781.2	4461083	Larimer	Carter Lake	Household	40	440	248	440
153300	480761.2	4461598	Larimer	Carter Lake	Household	0.75	640	95	640
245977	480769.1	4461555.5	Larimer	Carter Lake	Household	16	540	400	540
221573	480785.1	4461433.5	Larimer	Carter Lake	Household	60	540	245	540
187182	480808.4	4461357.5	Larimer	Carter Lake	Household	30	600	134	600
148344	479470.1	4459514.5	Larimer	Carter Lake	Domestic	1	480	30	480
270251	484030.1	4466880.5	Larimer	Carter Lake	Domestic	300	600	0	500
230407	482992.6	4465609	Larimer	Carter Lake	Domestic	29	480	190	430
19279	482990.3	4465489	Larimer	Carter Lake	Domestic		225	210	NA
228721	483154.1	4465203.5	Larimer	Carter Lake	Domestic	50	200	70	200
97619	476008.9	4458674	Larimer	Beach Hill	Household	13	210	18	198
65155	475652.6	4458750	Larimer	X Bar 7 Ranch	Household	1	455	54	450
132109	475347.5	4459311	Larimer	X Bar 7 Ranch	Household	0.67	410	28	410
150294	475442.5	4459421	Larimer	X Bar 7 Ranch	Household	0.83	425	18	425
69717	475531	4459433	Larimer	X Bar 7 Ranch	Household	1	505	3	500
254186	475352	4459599	Larimer	X Bar 7 Ranch	Household	5	500	280	420
230051	476291.7	4459184	Larimer	X Bar 7 Ranch	Household	5	425	78	400
81059	475823	4459314	Larimer	X Bar 7 Ranch	Household	5	575	20	575
149591	475686.9	4459525	Larimer	X Bar 7 Ranch	Household	15	14	10	13
98789	475580.8	4459655	Larimer	X Bar 7 Ranch	Household	0.5	500	?	310
102072	475383.6	4459842	Larimer	X Bar 7 Ranch	Household	4	310	20	310
96715	475536.1	4459869	Larimer	X Bar 7 Ranch	Household	1	395	100	395
89854	475824.7	4459675	Larimer	X Bar 7 Ranch	Domestic	5	355	8	340
91943	475829.3	4459985.5	Larimer	X Bar 7 Ranch	Household	15	105	50	102
200311	476107	4459736	Larimer	X Bar 7 Ranch	Household	1.2	300	5	280
200310	476221.2	4459725.5	Larimer	X Bar 7 Ranch	Domestic	1.5	300	75	300
140371	476177.9	4460222	Larimer	X Bar 7 Ranch	Household	1	1020	40	1020
148222	476595.4	4459786.5	Larimer	X Bar 7 Ranch	Domestic	0.5	370	85	370
163589	476783.4	4459406	Larimer	X Bar 7 Ranch	Household	20	305	110	305

153355	476855.8	4459237	Larimer	X Bar 7 Ranch	Household	9	265	155	265
251767	477519.3	4459272	Larimer	X Bar 7 Ranch	Domestic	2	600	300	600
294341	477705	4459598.5	Larimer	X Bar 7 Ranch	Household	30	400	134	400
181329	477865.9	4459542	Larimer	X Bar 7 Ranch	Domestic	18	380	56	380
181327	478152.5	4459297	Larimer	X Bar 7 Ranch	Domestic	10	340	57	340
294290	477932	4458612	Larimer	X Bar 7 Ranch	Domestic	0.5	1040	534	1040
200692	477702.9	4457547	Larimer	Beach Hill	Domestic	0.1	700	202	700
180541	477045.7	4456366	Larimer	Beach Hill	Domestic	1.5	770	400	770
294340	477798	4459777	Larimer	X Bar 7 Ranch	Domestic	15	220	10	220
246935	477287.7	4459900	Larimer	X Bar 7 Ranch	Domestic	15	21	12	21
33206	477141.9	4460053	Larimer	X Bar 7 Ranch	Monitoring	24	200	8	200
222649	477272.4	4460205	Larimer	X Bar 7 Ranch	Domestic	15	260	17	260
272521	477095	4460260	Larimer	X Bar 7 Ranch	Domestic	5	600	280	580
272455	477017.3	4460338	Larimer	X Bar 7 Ranch	Domestic	5	500	10	480
222283	477098.7	4460393	Larimer	X Bar 7 Ranch	Domestic	20	220	30	220
105680	477018	4460837	Larimer	Dry Hallow	Domestic	15	275	25	270
243802	477451.7	4461346	Larimer	Dry Hallow	Domestic	7	600	250	580
258338	477052.9	4461418	Larimer	Dry Hallow	Domestic	6	500	100	500
155433	476758.9	4461395	Larimer	Dry Hallow	Household	3.5	360	65	360
174677	476776.5	4461712	Larimer	Dry Hallow	Domestic	5	340	110	280
151255	476904.4	4462275	Larimer	Dry Hallow	Domestic	30	260	40	260
145769	476769.5	4462631	Larimer	Dry Hallow	Domestic	35	300	40	300
29450	476482.7	4467070	Larimer	Pinewood Reservoir	Domestic	3	210	80	210
16042	476504.5	4467186	Larimer	Pinewood Reservoir	Domestic	2	125	70	125
183634	476189.5	4467104	Larimer	Pinewood Reservoir	Domestic	30	380	11	360

Permit	UTM_x	UTM_y	County	Description	Well type	Yield (GPM)	TD (feet)	static water level (feet)	pumping level
219278	475338.4	4455952	Boulder	Beach Hill	Domestic	1	540	200	540
147490	475366.2	4456214	Boulder	Beach Hill	Household	1.27	600	63	570
88548	476271.3	4455532	Boulder	Beach Hill	Household	0.3	650	220	650
24916	475464.3	4456447	Boulder	Beach Hill	Domestic	1	640		NA
12982	475472	4456871	Boulder	Beach Hill	Domestic	1	307	46	78
218798	475338.5	4455329.5	Boulder	NW Lyons	Household	0.8	500	8	487
85682	475259.8	4455222.5	Boulder	NW Lyons	Domestic	15	70	10	70
67997	475488.2	4455091.5	Boulder	NW Lyons	Household	3	405	18	405
67193	475658.7	4455078.5	Boulder	NW Lyons	Commercial	15	40	15	30
129973	475313.8	4454933.5	Boulder	NW Lyons	Household	15	85	30	85
276006	475349.9	4454275.5	Boulder	NW Lyons	Household	1.25	600	5	500
92264	475261.4	4454074.5	Boulder	NW Lyons	Domestic	10	65	23	65
61102	475242.5	4453868.5	Boulder	NW Lyons	Domestic	5	130	50	130

24826	475429.8	4453610.5	Boulder	NW Lyons	Domestic	10	131	50	131
184025	476175.9	4454020	Boulder	Steamboat Mountain	Domestic	0.41	700	450	700
137500	476236.3	4454385.5	Boulder	Steamboat Mountain	Domestic	3.5	580	185	568
114555	476576.4	4454208.5	Boulder	Steamboat Mountain	Household	3	630	305	500
168268	476782.8	4454241.5	Boulder	Steamboat Mountain	Household	7	550	230	440
176178	476689.3	4454476	Boulder	Steamboat Mountain	Household	0.11	700	280	700
293794	476650.3	4455397	Boulder	Steamboat Mountain	Household	5	800	640	780
96387	476785.1	4455311.5	Boulder	Steamboat Mountain	Domestic	0.25	800	280	800
78557	476918.2	4455210.5	Boulder	Steamboat Mountain	Household	0.1	705	?	705
175267	477376.5	4455284	Boulder	Lyons Anticline	Household	15	690	265	690
168781	477277	4455186	Boulder	Lyons Anticline	Household	7	640	320	640
38529	477474.4	4455119.5	Boulder	Lyons Anticline	Domestic	5	540	455	540
214814	477558.7	4455190	Boulder	Lyons Anticline	Household	0.1	920	600	860
146518	477260.7	4454835	Boulder	Lyons Anticline	Household	0.1	1120	95	840
149205	477487.8	4454772.5	Boulder	Lyons Anticline	Household	5	480	180	480
232980	477639.8	4454465.5	Boulder	Lyons Anticline	Household	15	500	485	495
170126	477764.1	4454436	Boulder	Lyons Anticline	Household	6	652	255	652
40037	477457.3	4454306.5	Boulder	Lyons Anticline	Domestic	8	425	325	425
232979	477635.6	4454264.5	Boulder	Lyons Anticline	Household	6	500	130	495
123593	476746.4	4453618	Boulder	N Lyons	Domestic	15	325	200	325
84942	476317.8	4453462	Boulder	NW Lyons	Household	15	130	40	130
19222	476220.3	4453572	Boulder	NW Lyons	Domestic	10	23	8	23
205207	475994.9	4453768	Boulder	NW Lyons	Household	25	300	105	300
195443	475984.8	4453604	Boulder	NW Lyons	Household	18	280	120	280
195971	475848	4453623	Boulder	NW Lyons	Household	13.3	260	163	184
212127	475833	4453639	Boulder	NW Lyons	Household	14.2	250	112	120
59799	475823.7	4453595	Boulder	NW Lyons	Domestic	10	50	8	50
194241	475801.6	4453578	Boulder	NW Lyons	Household	30	280	105	280
193019	475785.7	4453533	Boulder	NW Lyons	Household	20	400	200	400
88544	475709.5	4453535	Boulder	NW Lyons	Household	15	230	40	230
65272	475267.5	4453533	Boulder	W Lyons	Household	10	150	50	150
130179	475403.6	4453452	Boulder	W Lyons	Household	15	75	8	68
102773	474946.3	4453176	Boulder	W Lyons	Household	7.5	108	18	105
22935	475022.4	4453204	Boulder	W Lyons	Domestic	2	275	150	275
970	475348	4453330	Boulder	W Lyons	Stock	9	300	200	300

85347	475429.4	4453134	Boulder	W Lyons	Domestic	15	140	30	130	
102789	475125.8	4453079	Boulder	W Lyons	Household	10	150	18	143	
83656	475214.3	4453018	Boulder	W Lyons	Household	15	490	0	487	
98	475223.2	4453006	Boulder	W Lyons	Irrigation	15	21	7	12	
96296	475306.6	4453074	Boulder	W Lyons	Household	15	100	22	100	
114599	475305.7	4453010	Boulder	W Lyons	Household	1	545	49	545	
66451	475567.3	4452978	Boulder	W Lyons	Household	15	100	20	80	
140556	475523.7	4453327	Boulder	W Lyons	Household	40	80	6	80	
260899	475555.1	4453224	Boulder	W Lyons	Domestic	15	150	7	145	
69411	476040.5	4453241	Boulder	W Lyons	Household	15	150	60	150	
41821	476247.3	4452791	Boulder	W Lyons	Domestic Irrigation	10	575	224	575	
64089	476285	4452831	Boulder	W Lyons	Household	17	600	150	600	
41820	476489.9	4453038	Boulder	W Lyons	Domestic Irrigation	10.4	300	112	173	
237448	475217.2	4450856	Boulder	SW Lyons	Household	10	200	15	180	
157675	475836	4451096	Boulder	SW Lyons	Domestic	30	240	1	240	
22623	475783.3	4450785	Boulder	SW Lyons	Domestic	100	105		9	102
111390	476292	4451157	Boulder	SW Lyons	Household	1.5	400		80	400
42227	475366.8	4450375	Boulder	SW Lyons	Domestic	2	675		560	675
170551	475415.5	4450523	Boulder	SW Lyons	Household	4	810		653	720
217824	475439.8	4450471	Boulder	SW Lyons	Household	4	780		440	780
166106	475462.5	4450386	Boulder	SW Lyons	Household	10	800		630	800
170373	475477.3	4450356	Boulder	SW Lyons	Household	7.5	830		294	830
291188	475603	4450442	Boulder	SW Lyons	Household	8.5	900		810	900
268001	475646.5	4450235	Boulder	SW Lyons	Household	8.5	860		458	860
224736	475814.7	4450526	Boulder	SW Lyons	Household	9	660		350	660
172162	475924.6	4450539	Boulder	SW Lyons	Household	7.5	600		305	600
217674	475797	4450327	Boulder	SW Lyons	Household	5.5	800		500	800
222269	475718.5	4450153	Boulder	SW Lyons	Household	20	620		260	620
130062	475579.2	4449975.5	Boulder	SW Lyons	Household	4	487		380	480
164682	475631.4	4449821.4	Boulder	SW Lyons	Household	6	527		300	527
198071	475885.9	4450130	Boulder	SW Lyons	Household	3	400		180	400
202314	476086.2	4450310	Boulder	SW Lyons	Household	15	260		80	260
157065	476132.7	4450369	Boulder	SW Lyons	Household	1.5	120		85	120
146615	476181	4450378	Boulder	SW Lyons	Household	5	560		260	560
103472	476067.7	4450051	Boulder	SW Lyons	Household	3.5	530		200	530
146615	476098	4450116	Boulder	SW Lyons	Household	4	740		265	740
162696	476168.1	4450183	Boulder	SW Lyons	Household	7	660		420	660
114251	476192.5	4450276	Boulder	SW Lyons	Household	15	505		345	505
188279	476159.3	4450066	Boulder	SW Lyons	Household	2.5	700		300	700
115142	476111.2	4449882.5	Boulder	SW Lyons	Household	6	680		550	680
138526	476096.4	4449913.4	Boulder	SW Lyons	Household	8	640		319	615
186666	476224.7	4449942	Boulder	SW Lyons	Household	3	700		475	700
242958	476219.6	4450019	Boulder	SW Lyons	Household	2	800		375	800

178361	476248.2	4449877	Boulder	SW Lyons	Household	4	615	378	615
134119	476277.9	4449815	Boulder	SW Lyons	Household	5	600	355	600
260348	476312.3	4450119	Boulder	SW Lyons	Household	29	660	250	660
135028	476327.7	4450131	Boulder	SW Lyons	Household	5	560	340	540
171172	476354.9	4450373	Boulder	SW Lyons	Household	6	600	286	600
106037	476404.5	4450418	Boulder	SW Lyons	Household	5	755	340	755
132550	476420	4450436	Boulder	SW Lyons	Household	0.08	880	800	880
134565	476561.2	4450507	Boulder	SW Lyons	Household	1	1008	370	1008
119389	474408.4	4450318	Boulder	SW Lyons	Household	7	705	495	705
220939	472405.1	4445476	Boulder	Plumely Canyon	Domestic	5.6	360	138	252
219879	472473.6	4445048	Boulder	Plumely Canyon	Domestic	5.2	320	103	215
219981	473281.4	4444135	Boulder	Geer Canyon	Domestic	20	160	14	160
12500	474854.3	4428755	Boulder	Flagstaff Mountain	Municipal	13	245	110	190
5535	474933.3	4428802.6	Boulder	Flagstaff Mountain	Commercial	4	670	270	670
31876	474657.8	4429115	Boulder	Boulder Creek	Irrigation	30	220	25	220
10260	474534.1	4429606.6	Boulder	West Pearl	Commercial	4	185	28	175
175774	474309.5	4430404.1	Boulder	Sunshine Canyon	Domestic	1.1	440	10	440
101992	474277.3	4430449	Boulder	Sunshine Canyon	Domestic	3	405	15	405
166580	474274	4430514.6	Boulder	Sunshine Canyon	Domestic	10	400	48	400
25894	474133.1	4430415	Boulder	Sunshine Canyon	Domestic	2.5	365	30	243
106928	474179.3	4430592.1	Boulder	Sunshine Canyon	Household	1.66	405	10	405
100845	473858.2	4434684.2	Boulder	Fourmile Canyon	Household	0.1	755	20	755
12821	473723.1	4434826	Boulder	Fourmile Canyon	Municipal	5	305	75	120
67547	473500.7	4434836	Boulder	Fourmile Canyon	Household	4	500	40	495
170766	473551.4	4434955	Boulder	Fourmile Canyon	Household	7	650	120	435
159272	473610.1	4434940	Boulder	Fourmile Canyon	Household	2	380	2	380
41784	473619	4435022	Boulder	Fourmile Canyon	Domestic	3	140	5	89
289320	473678.2	4435272	Boulder	Fourmile Canyon	Household	9	500	146	500
56728	473579.2	4435334	Boulder	Fourmile Canyon	Domestic Stock	4	211	31	200
221729	473467.3	4435296	Boulder	Fourmile Canyon	Domestic	2.33	600	60	600
203493	473633.2	4435458	Boulder	Fourmile Canyon	Household	5	560	160	545
15159	473576.7	4435700	Boulder	Fourmile Canyon	Domestic	0.1	645	190	430

148030	473829.4	4435736	Boulder	Fourmile Canyon	Domestic	17	700		400	700
78147	473500.1	4436247	Boulder	Sixmile Canyon	Household	1	330		177	300
185673	473376	4436391	Boulder	Sixmile Canyon	Household	dry	700	NA		NA
14463	473513.3	4436400	Boulder	Sixmile Canyon	Domestic	4	305	NA		305
14463	473513.4	4436427	Boulder	Sixmile Canyon	Domestic	1	155		65	150
47790	473532.6	4436461	Boulder	Sixmile Canyon	Domestic	2.5	505		205	505
11275	473839	4436528	Boulder	Sixmile Canyon	Domestic	1	200		80	126
266243	473688.9	4436605	Boulder	Sixmile Canyon	Domestic	5.45	500		206	500
38144	473581.4	4436995	Boulder	Sixmile Canyon	Domestic	5	776		260	720
38144	473471.2	4436996	Boulder	Sixmile Canyon	Domestic	0.8	725		200	725
163058	473475.7	4436746	Boulder	Sixmile Canyon	Domestic	1	300		80	300
25411	473256.4	4436756	Boulder	Sixmile Canyon	Domestic	3.5	305		30	305
63141	473171.2	4436791	Boulder	Sixmile Canyon	Household	2.7	215		55	210
282242	473075.9	4436797	Boulder	Sixmile Canyon	Domestic Stock	2	400		0	400
103230	473103.1	4436605	Boulder	Sixmile Canyon	Domestic	0.25	675		10	675
155918	472999.3	4437096	Boulder	Sixmile Canyon	Household	5	400		15	400
270260	473105	4437185	Boulder	Sixmile Canyon	Household	3.5	400		35	600
90871	473514.3	4437073	Boulder	Sixmile Canyon	Household	2.5	410		85	410
89803	473471.8	4437118	Boulder	Sixmile Canyon	Household	18	730		225	730
127954	473673.4	4437145	Boulder	Sixmile Canyon	Household	3	400		47	400
72256	473676.6	4437267	Boulder	Sixmile Canyon	Household	2.5	165		15	165
31770	473746	4437271	Boulder	Sixmile Canyon	Domestic	1	23		8	13
103654	473848.6	4437312	Boulder	Sixmile Canyon	Household	0.5	405		75	405
148030	473872.1	4437385	Boulder	Sixmile Canyon	Domestic	6	600		120	600
98556	473741.9	4437418	Boulder	Sixmile Canyon	Household	3	305	NA		305
81051	473681.6	4437510	Boulder	Sixmile Canyon	Household	1.5	245		10	229
133089	473826.4	4437752	Boulder	Sixmile Canyon	Household	3	535		0	535
64938	473673	4437785	Boulder	Sixmile Canyon	Household	1.5	230		60	153
65192	473812	4437920	Boulder	Sixmile Canyon	Household	2.5	500		44	500

149833	473727.2	4437997	Boulder	Sixmile Canyon	Household	6	365		6	365
62496	473791.3	4438095	Boulder	Sixmile Canyon	Household	2	300		200	295
165792	473866.4	4438114	Boulder	Sixmile Canyon	Household	3	502		250	493
132529	473821.6	4438196	Boulder	Sixmile Canyon	Household	7	260		30	260
15969	473732.6	4438462	Boulder	Sixmile Canyon	Domestic	0.1	290		0	285
64939	473727.5	4438533	Boulder	Sixmile Canyon	Domestic	2	210		35	210
150444	473767.5	4438655	Boulder	Sixmile Canyon	Household	30	260		1	260
170412	473500.9	4438994	Boulder	Sixmile Canyon	Domestic	0.9	700		26	700
159862	473610	4439129	Boulder	Sixmile Canyon	Domestic	2.5	665		235	657
160041	473575.5	4439267	Boulder	Sixmile Canyon	Domestic	2.5	800		234	800
169590	473712.8	4440681	Boulder	Left Hand Creek	Domestic	40	360		2	360
160859	473786	4440685	Boulder	Left Hand Creek	Household	5	420		0	420
162205	473719	4440803	Boulder	Left Hand Creek	Household	15	400		90	398
155998	473834.5	4440874	Boulder	Left Hand Creek	Household	2	400		20	400
160004	473779.4	4440925	Boulder	Left Hand Creek	Domestic	2.7	460		20	460
150968	473745.1	4441215	Boulder	Left Hand Creek	Household	10	305		40	250
157699	473747.1	4441321	Boulder	Left Hand Creek	Domestic	12	205		100	137
161298	473823.3	4441322	Boulder	Left Hand Creek	Household	3.5	405		0	405
233088	475044.1	4420234	Boulder	South Boulder Creek	Commercial	7.3	540		22	134

Permit	UTM_x	UTM_y	County	Description	Well type	Yield (GPM)	TD (feet)	static water level (feet)	pumping level
10467	476483.7	4414406	Jefferson	Coal Creek	Monitoring Well	4	50	25	50
183639	476308.6	4414477	Jefferson	Coal Creek	Domestic	10	475	250	475
132718	474884.2	4418058	Jefferson	Eldorado Mountain	Domestic	1.1	1210	1000	1210
72226	476365.3	4413283.5	Jefferson	Rocky Flats	Household	5	260	30	173
67546	476425.7	4412731.5	Jefferson	Rocky Flats	Domestic	7	253	50	240
11877	476491	4412785.4	Jefferson	Rocky Flats	Domestic	6	325	45	280
45022	476492.8	4412381.4	Jefferson	Rocky Flats	Domestic	9	230	30	210
53597	476494.4	4411980.9	Jefferson	Rocky Flats	Domestic	6	200	43	152
13439	476449.4	4411807.5	Jefferson	Rocky Flats	Municipal	17	465	105	350
28408	476773.6	4411981.9	Jefferson	Rocky Flats	Domestic	1	308	139	303

38979	476497.5	4411579.4	Jefferson	Rocky Flats	Domestic	10	230	146	225
116029	476979.7	4411086.4	Jefferson	Fireclay	Domestic	3	715	127	715
208002	477846.9	4406476.3	Jefferson	Van Bibber Creek	Domestic	1	305	100	305
207274	477770.7	4406475.8	Jefferson	Van Bibber Creek	Domestic	3.5	955	1	955
276872	477778.4	4406393.5	Jefferson	Van Bibber Creek	Domestic Stock	3.5	696	1	696
212705	478018.1	4405969.3	Jefferson	Van Bibber Creek	Domestic Stock	4	705	0	705
33176	478016.3	4405944.3	Jefferson	Van Bibber Creek	Monitoring Well	1	1245	1000	1245
230737	478415	4405374.8	Jefferson	Van Bibber Creek	Domestic Stock	3	280	15	259
229358	478433.5	4405170.3	Jefferson	Van Bibber Creek	Domestic Stock	100	405	0	405
11234	478816.1	4404326.8	Jefferson	Cressmans Gulch	Domestic	2	300	35	310
229760	478687.8	4405551.5	Jefferson	Cressmans Gulch	Domestic Stock	20	425	30	425
204552	479022.2	4403630.8	Jefferson	Cressmans Gulch	Domestic	4	520	0	300
29702	479218.2	4403512.3	Jefferson	Cressmans Gulch	Domestic	14	117	111	117
17380	479257	4403478	Jefferson	Cressmans Gulch	Domestic	?	400	380	NA
883	479350	4403349	Jefferson	Cressmans Gulch	Domestic	10	80	40	53
883	479216.5	4403114	Jefferson	NW Golden	Domestic	12	200	10	133
249390	479352.6	4402515	Jefferson	NW Golden	Domestic	3	540	1	535
302208	480790	4398736	Jefferson	SW Golden	Monitoring Well	NA	56	NA	NA
302209	480797	4398704	Jefferson	SW Golden	Monitoring Well	NA	50	NA	NA
62709	481046.8	4397939	Jefferson	SW Golden	Stock	120	360	2	240
7767	481588.6	4396288	Jefferson	SW Golden	Commercial	12	160	17	160
231	481990.9	4396284	Jefferson	SW Golden	Domestic	30	622	?	400
7784	481989.8	4395880	Jefferson	SW Golden	Commercial	10	509	26	210
15081	482459.9	4394174	Jefferson	Mount Vernon Canyon	Municipal	5	1212	89	689
47951	482631.9	4392434	Jefferson	Cherry Gulch	Domestic	15	100	20	66
56900	482577	4392322	Jefferson	Cherry Gulch	Domestic	2	300	20	40
2163	482781.3	4391957	Jefferson	Red Rocks	Domestic	0.75	1001	18	1001
76308	482753.9	4391852	Jefferson	Red Rocks	Household	4	450	10	300
201433	482967.3	4391811	Jefferson	Red Rocks	Monitoring Well	15	400	25	400
52581	482836.2	4391721	Jefferson	Red Rocks	Domestic	2	450	42	384
214108	482820.3	4389310	Jefferson	Morrison	Domestic	9	1090	0	1090
26357	482731.5	4388694	Jefferson	Morrison	Household	3	260	30	173
1341	483175.7	4388629	Jefferson	Morrison	Stock	0.1	210	190	210
122641	483346.6	4388824	Jefferson	Morrison	Domestic	0.5	400	110	400
95085	483440.6	4388771	Jefferson	Morrison	Household	4	500	55	450

86764	483535.2	4388596	Jefferson	Morrison	Household	2	550	200	367
83497	483557.2	4388477	Jefferson	Morrison	Household	4	550	210	545
147686	483589.9	4388566	Jefferson	Morrison	Household	2.5	450	75	300
146695	482889.9	4388428	Jefferson	Morrison	Household	1.5	1002	450	995
117878	482892.7	4388416	Jefferson	Morrison	Household	0.5	690	40	685
270057	483113.6	4388431	Jefferson	Morrison	Household	1	905	42	905
65004	482925.6	4388335	Jefferson	Morrison	Household	0.5	402	40	400
68895	483190	4388366	Jefferson	Morrison	Household	5.1	250	28	215
82555	483159.6	4388332	Jefferson	Morrison	Household	4	640	100	427
155870	483436.7	4388382	Jefferson	Morrison	Domestic	1.5	405	50	270
238652	483498.6	4388387	Jefferson	Morrison	Domestic	2	480	72	450
85100	483373	4388304	Jefferson	Morrison	Domestic	1	600	70	570
35685	482779.6	4388229	Jefferson	Morrison	Domestic	1	522	60	520
160131	482829.3	4388256	Jefferson	Morrison	Household	1.73	752	230	740
72225	482907.3	4388190	Jefferson	Morrison	Household	2.5	375	15	370
79782	482946.8	4388220	Jefferson	Morrison	Household	0.33	600	190	595
213242	483028	4388208	Jefferson	Morrison	Household	1.25	1200	82	1200
27276	483038.3	4388204	Jefferson	Morrison	Domestic	2	80	40	65
168147	483079.5	4388202	Jefferson	Morrison	Household	7	630	15	630
150557	483150.9	4388246	Jefferson	Morrison	Domestic	15	225	30	150
84408	483207	4388197	Jefferson	Morrison	Household	2	605	80	605
93166	483381.9	4388234.5	Jefferson	Morrison	Household	0.5	460	207	307
42396	483340.5	4388097	Jefferson	Morrison	Domestic	0.5	300	30	300
96974	483386.7	4388094	Jefferson	Morrison	Domestic	1	150	16	100
24223	483032.6	4388109	Jefferson	Morrison	Domestic	0.5	952	220	940
146764	482746.9	4387947.5	Jefferson	Strain Gulch	Household	0.67	705	280	470
188451	483807.3	4388126.5	Jefferson	Strain Gulch	Household	4.5	451	30	451
271997	483869	4387854	Jefferson	Strain Gulch	Household	2	805	140	805
119138	483935.5	4387767.5	Jefferson	Strain Gulch	Household	1	420	145	280
11770	483569.7	4387454	Jefferson	Strain Gulch	Domestic	1	750	8	318
293802	483885.1	4387351	Jefferson	Strain Gulch	Domestic Stock	1.5	952	160	635
147626	483362.8	4386951	Jefferson	Strain Gulch	Commercial	1.33	580	0	580
51487	483442.6	4386876	Jefferson	Strain Gulch	Domestic	1	735	0	450
294376	483974	4387055	Jefferson	Strain Gulch	Domestic Stock	4	901	40	600
293801	484335	4386991	Jefferson	Strain Gulch	Domestic Stock	1.5	1002	951	1002
6510	483574.3	4386644	Jefferson	Turkey Creek	Domestic	35	704	0	236
33745	483192.9	4386502	Jefferson	Turkey Creek	Domestic	7	475	70	470
91121	483472.8	4386410	Jefferson	Turkey Creek	Commercial	4	780	20	520
150394	483497.4	4386385	Jefferson	Turkey Creek	Commercial	15	705	50	470
107109	483500.6	4386349	Jefferson	Turkey Creek	Household	30	510	20	340
11138	483576.6	4386238	Jefferson	Turkey Creek	Domestic	6	140	70	140

31990	483971.1	4386243	Jefferson	Turkey Creek	Domestic	0.1	536	48	498
287399	483338	4385793	Jefferson	Turkey Creek	Domestic Stock	11.8	702	100	245
35628	484175.9	4386031	Jefferson	Turkey Creek	Domestic	3	150	80	120
55282	484770.4	4385840	Jefferson	Turkey Creek	Domestic	10	450	200	300
152	483357.8	4385232	Jefferson	Turkey Creek	Domestic	1	122	63	81
137154	483705.1	4385116	Jefferson	Willow Springs Ranch	Domestic Stock	5	820	40	800
143025	483849	4384955	Jefferson	Willow Springs Ranch	Commercial	5	440	300	440
235200	485224.1	4385543	Jefferson	Kingfisher Lake	Domestic	5	1201	140	1191
9135	485168.1	4385438	Jefferson	Kingfisher Lake	Domestic	6	142	20	95
37733	485163.7	4385034	Jefferson	Kingfisher Lake	Domestic	2.5	625	70	625
12417	485563.4	4384636	Jefferson	Weaver Gulch	Domestic	2	411	400	411
27001	485159.3	4384631	Jefferson	Weaver Gulch	Domestic	0.1	145	40	97
20902	484743.1	4383819	Jefferson	Weaver Gulch	Irrigation	75	772	617	772
131231	485385.8	4383538	Jefferson	Dutch Creek	Domestic Stock	66	495	155	495
77909	485237.8	4382495	Jefferson	Dutch Creek	Domestic Stock	14	652	26	435
63124	485279	4381444	Jefferson	Dutch Creek	Household	3.5	248	86	165
103087	487263.4	4377523	Jefferson	Deer Creek Canyon	Household	15	300	10	295
91257	487361.8	4377590	Jefferson	Deer Creek Canyon	Household	5	465	210	460
108478	487421.1	4377650	Jefferson	Deer Creek Canyon	Household	2	520	30	480
90541	487503.2	4377709	Jefferson	Deer Creek Canyon	Household	2	715	247	710
90540	487345.9	4377392	Jefferson	Deer Creek Canyon	Household	4	800	75	795
36686	487451.3	4377285	Jefferson	Deer Creek Canyon	Domestic	3	210	0	140
91258	487499.4	4377572	Jefferson	Deer Creek Canyon	Household	2	850	210	845
101658	487544.7	4377587	Jefferson	Deer Creek Canyon	Household	1	395	6	350
141318	487604.8	4377616	Jefferson	Deer Creek Canyon	Domestic	2	710	41	677
132461	487628.1	4377600	Jefferson	Deer Creek Canyon	Household	2.125	803	200	803
100562	487606.5	4377555	Jefferson	Deer Creek Canyon	Household	2	425	150	420
150635	487648.6	4377684	Jefferson	Deer Creek Canyon	Household	2.5	702	200	692
133288	487709	4377706	Jefferson	Deer Creek Canyon	Household	2	845	91	700

136642	487662.4	4377737	Jefferson	Deer Creek Canyon	Household	1.5	600	200	595
137015	487741.4	4377523	Jefferson	Deer Creek Canyon	Household	2	600	120	595
66361	487725.4	4377386	Jefferson	Plymouth Creek	Domestic	4	240	70	235
144301	487779.8	4377568	Jefferson	Deer Creek Canyon	Household	1	705	143	677
98682	487987.6	4377709	Jefferson	Plymouth Creek	Household	2	625	120	620
123967	488000.2	4377641	Jefferson	Plymouth Creek	Household	0.83	602	96	335
91422	488023.4	4377625	Jefferson	Plymouth Creek	Household	4.5	400	150	395
100587	488037	4377686	Jefferson	Plymouth Creek	Household	3.8	650	160	645
92707	488226.2	4377622	Jefferson	Plymouth Creek	Household	4	640	222	630
136106	487830.9	4377369	Jefferson	Plymouth Creek	Household	1	500	?	500
63846	487818.3	4377275	Jefferson	Plymouth Creek	Domestic	2	520	60	480
52953	487857.1	4377280	Jefferson	Plymouth Creek	Domestic	0.75	610	156	472
179511	489449.9	4374515.8	Jefferson	SW Littleton	Monitoring well	NA	265	NA	NA
166157	489553.3	4374432.3	Jefferson	SW Littleton	Monitoring well	NA	165	145	NA
166160	489389.4	4374118.8	Jefferson	SW Littleton	Monitoring well	NA	127	107	NA
166158	489419.9	4374094.8	Jefferson	SW Littleton	Monitoring well	NA	156	126	NA
166161	489408	4373918.3	Jefferson	SW Littleton	Monitoring well	NA	95	81	NA
166173	489524	4373849.3	Jefferson	SW Littleton	Monitoring well	NA	132	117	NA
166175	489566.8	4373779.8	Jefferson	SW Littleton	Monitoring well	NA	190	165	NA
166176	489505.9	4373760.8	Jefferson	SW Littleton	Monitoring well	NA	98	74	NA
166151	489710.3	4373670.8	Jefferson	SW Littleton	Monitoring well	NA	88	52	NA
166164	489528.3	4373188.3	Jefferson	SW Littleton	Monitoring well	NA	178	158	NA
166163	489554.2	4373169.8	Jefferson	SW Littleton	Monitoring well	NA	65	45	NA
166152	489765.4	4373518.3	Jefferson	SW Littleton	Monitoring well	NA	99	50	NA
209389	490958.5	4372068	Jefferson	NW Kassler	Monitoring well	NA	99	21	NA
76878	491011.7	4371611	Jefferson	NW Kassler	Remediation	16	268	160	250
124705	490688.5	4371660	Jefferson	NW Kassler	Other	NA	67	34	NA
34562	491041.6	4371882	Jefferson	NW Kassler	Monitoring well	NA	106	6	NA
34554	491246	4371770	Jefferson	NW Kassler	Monitoring well	NA	65	3	NA

Permit	UTM_x	UTM_y	County	Description	Well type	Yield (GPM)	TD (feet)	static water level (feet)	pumping level
27664	492721.8	4366806	Douglas	Roxborough Park	Domestic	5	298	19	269
218140	494577.1	4363045	Douglas	Willow Creek	Domestic	10	605	120	605
161922	497989.2	4359782	Douglas	Jarre Canyon	Domestic Stock	3	290	75	130

149776	498968.7	4347042	Douglas	Spring Creek	Domestic Stock	15	85	19	45
46467	498792.6	4350315	Douglas	W Dawson Butte	Monitoring well	NA	703	NA	NA
48448	503560.1	4343527	Douglas	West Plum Creek	Industrial	120	50	10	36
48447	503512.7	4343253	Douglas	West Plum Creek	Municipal	115	56	8	30
31608	504014.5	4343499	Douglas	West Plum Creek	Domestic	8	126	55	70
36894	504012.8	4343094	Douglas	West Plum Creek	Stock	5	101	18	83
63681	503353.3	4342274	Douglas	West Plum Creek	Household	2	160	12	80
260455	502897.3	4342382	Douglas	West Plum Creek	Domestic	2	460	1	120
51970	502591.6	4342382	Douglas	West Plum Creek	Domestic	2	154	20	60
19546	502409	4342288	Douglas	West Plum Creek	Domestic	30	43	8	43
33853	504215.3	4343299	Douglas	West Plum Creek	Monitoring well	20	318	100	135
213322	504384.4	4343007	Douglas	West Plum Creek	Domestic Stock	20	318	115	140
269006	504460	4342984	Douglas	West Plum Creek	Domestic Stock	30	363	130	243
28109	504751	4342595	Douglas	West Plum Creek	Domestic	2	575	110	280
267374	504582	4342124	Douglas	West Plum Creek	Monitoring well	5	601	140	591
17358	504412.3	4341884	Douglas	West Plum Creek	Monitoring well	6	320	100	NA
162146	504382.5	4341739	Douglas	West Plum Creek	Stock	6	320	100	180
162145	504291.1	4341724	Douglas	West Plum Creek	Stock	5	34	15	34
18565	504005.3	4341886	Douglas	West Plum Creek	Monitoring well	7	400	35	NA
162905	503835	4341680	Douglas	West Plum Creek	Domestic Stock	7	400	35	200
154472	503685.7	4341695	Douglas	West Plum Creek	Stock	30	75	12	21
154473	503475.6	4341430	Douglas	West Plum Creek	Domestic Stock	5	200	45	85
267377	503403.6	4340462	Douglas	West Plum Creek	Monitoring well	15	351	100	341
153952	502424.9	4341465	Douglas	West Plum Creek	Stock	5	446	7	326
267378	502356.5	4341356	Douglas	West Plum Creek	Monitoring well	200	453	0	443
21988	504003.3	4340281	Douglas	West Plum Creek	Domestic	8	48	10	48
267376	504606.8	4340481	Douglas	West Plum Creek	Monitoring well	1	701	68	691
64623	504629	4339880	Douglas	West Plum Creek	Household	1.5	220	56	200
27935	489735.3	4332999	Douglas	Trout Creek	Domestic	2	100	?	100
21664	489334.7	4333001	Douglas	Trout Creek	Domestic	20	80	16	53
94073	488222.8	4334332	Douglas	Trout Creek	Household	1	260	45	173
45458	488122.1	4334635	Douglas	Trout Creek	Domestic	4	190	65	127
194239	488258.2	4334600	Douglas	Trout Creek	Household	10	360	180	360
171188	488233.5	4334694	Douglas	Trout Creek	Household	8.5	400	25	370
197223	488233.1	4334792	Douglas	Trout Creek	Household	27	400	180	400
172163	488068.2	4334894	Douglas	Trout Creek	Household	2	300	90	299
56406	488119.6	4335029	Douglas	Trout Creek	Domestic	1.5	210	43	190
151799	488273.7	4334966	Douglas	Trout Creek	Household	5	200	45	190

188940	488235	4335142	Douglas	Trout Creek	Household	4	300	40	270
199135	488708.3	4334972	Douglas	Trout Creek	Household	3	220	50	210

Permit	UTM_x	UTM_y	County	Description	Well type	Yield (GPM)	TD (feet)	static water level (feet)	pumping level
122564	492857.1	4329795	Teller	Trout Creek	Household	3	255	230	250
52029	493082.4	4328618	Teller	Trout Creek	Domestic	0.3	300	230	290
183817	489735.9	4328749	Teller	Trout Creek	Domestic	4.5	250	58	210
35	489898.6	4328640	Teller	Trout Creek	Stock	6.7	173	115	173
156364	489926.2	4327421	Teller	Trout Creek	Domestic	3	400	91	267
138530	490132.5	4327289	Teller	Trout Creek	Domestic Stock	15	320	48	188
107937	490225	4327059	Teller	Trout Creek	Domestic Stock	1.5	393	250	393
118235	490146.4	4326929	Teller	Trout Creek	Household	1	390	240	390
31217	489871.6	4327016	Teller	Trout Creek	Domestic	NA	160	20	NA
268058	489920.8	4326950	Teller	Quinlan Gulch	Household	2.75	400	100	400
130087	489921.8	4326722	Teller	Quinlan Gulch	Household	5	380	35	253
78659	490092.8	4326649	Teller	Quinlan Gulch	Household	1	202	24	200
109698	490251	4326702	Teller	Quinlan Gulch	Household	2	400	150	400
144322	489952.9	4326584	Teller	Quinlan Gulch	Household	2	340	65	340
1993	489685	4326420	Teller	Quinlan Gulch	Domestic	28	87	79	87
86707	489941.2	4326462	Teller	Quinlan Gulch	Household	0.5	200	60	200
31217	490192.4	4326529	Teller	Quinlan Gulch	Domestic	2.25	360	91	360
190928	490242.8	4326489	Teller	Quinlan Gulch	Household	5	260	50	160
147783	490084.8	4326417	Teller	Quinlan Gulch	Household	3	350	55	342
138988	490084	4326416	Teller	Quinlan Gulch	Domestic	2	450	180	450
119577	490093.9	4326399	Teller	Quinlan Gulch	Household	1.8	340	70	340
150480	490000	4326268	Teller	Quinlan Gulch	Household	2	360	150	350
68206	490449.7	4326243	Teller	Quinlan Gulch	Commercial Irrigation	5	1080	80	600
93203	490848.3	4326049	Teller	Quinlan Gulch	Domestic	15	60	22	60
116378	490725.3	4325166	Teller	Ryan Gulch	Household	12	100	21	67
116150	491053.9	4325373	Teller	Ryan Gulch	Household	1	400	70	267
115195	490968.5	4325236	Teller	Ryan Gulch	Household	8	140	25	140
174857	491121.8	4325119	Teller	Ryan Gulch	Domestic	7	60	12	50
535	491681.3	4326011	Teller	Trout Creek	Domestic	10	63	16	63
70575	491584.7	4325506	Teller	Trout Creek	Household	10	80	80	185
12132	491718.3	4325357	Teller	Trout Creek	Other	60	220	70	150
44333	491499	4325398	Teller	Trout Creek	Domestic	1	250	70	167
15401	491481.3	4325385	Teller	Trout Creek	Domestic	75	140	25	140
25353	491480.5	4325362	Teller	Trout Creek	Domestic	120	155	10	155
8479	492083.9	4325209	Teller	Trout Creek	Domestic	10	65	24	59
58770	493868.4	4325144	Teller	South Johns Gulch	Commercial	15	460	350	386

147784	493845.9	4325115	Teller	South Johns Gulch	Commercial	20	300	147	300
27044	491489.3	4323789	Teller	Trout Creek	Domestic	2	50	35	50
152227	491959.6	4323071	Teller	Trout Creek	Household	1	300	35	200
231705	492316.5	4323565	Teller	Long Gulch	Domestic	4.5	220	8	220
39898	493079.9	4323837	Teller	Long Gulch	Domestic	1.5	250	50	170
119999	492591	4323249	Teller	Long Gulch	Domestic	2	275	2	250
134013	492896.6	4322994	Teller	Long Gulch	Domestic	6	100	10	67
32796	492893.1	4322829	Teller	Long Gulch	Monitoring well	7.5	340	2	340
194020	493647.8	4322547	Teller	Long Gulch	Domestic	1.25	600	290	600
111687	493305.1	4322431	Teller	Long Gulch	Household	1	200	15	133
92000	493311.9	4322420	Teller	Long Gulch	Domestic	0.5	300	8	230
93105	493354	4322144	Teller	Long Gulch	Domestic	1	150	6	100
173570	494114	4322060	Teller	Long Gulch	Domestic	10	140	20	140
162938	494444.4	4322347	Teller	Long Gulch	Domestic	15	200	65	199
169803	495141.4	4321856	Teller	Long Gulch	Domestic	3.16	240	25	240
177801	495490.3	4321261	Teller	Long Gulch	Domestic	1.5	400	95	370
283313	494290.3	4321313	Teller	Long Gulch	Domestic Stock	3	820	350	800
94292	494151.7	4321255	Teller	Long Gulch	Household	0.1	300	192	295
33071	493494.8	4320979	Teller	Trout Creek	Domestic	6	58	53	58
104118	493296.6	4321007	Teller	Trout Creek	Household	1.75	240	43	160
96632	493263.4	4320669	Teller	Trout Creek	Domestic Stock	12	60	12	60
89749	493183.3	4320655	Teller	Trout Creek	Household	1	160	47	155
52528	493155.4	4320698	Teller	Trout Creek	Domestic	3	300	62	290
12740	493155.4	4320698	Teller	Trout Creek	Domestic	30	94	70	94
41302	493146.2	4320334	Teller	Trout Creek	Municipal	11	140	12	117
64500	493152.5	4320042	Teller	Trout Creek	Domestic	4	100	17	80
18796	492875	4320103	Teller	Trout Creek	Commercial	5	150	18	130
113630	493283.7	4320267	Teller	Trout Creek	Household	5	200	40	133
164111	493532	4320239	Teller	Trout Creek	Household	6	200	25	190
43815	493576.4	4320568	Teller	Trout Creek	Domestic	7	545	135	480
43813	493606.7	4320574	Teller	Trout Creek	Domestic	2	200	125	200
43814	493698.1	4320574	Teller	Trout Creek	Stock	2	150	100	150
58017	493703.4	4320559	Teller	Trout Creek	Commerical	7	545	135	480
64428	493705.4	4320428	Teller	Trout Creek	Household	12	162	?	125
51359	493713.4	4320269	Teller	Trout Creek	Household	1	280	92	275
9721	493792.3	4320149	Teller	Trout Creek	Domestic	3	230	110	230
28543	493782.1	4320115	Teller	Trout Creek	Domestic	6	57	56	57
12917	493817.2	4320026	Teller	Trout Creek	Municipal	9	127	60	127
170600	493892.4	4320166	Teller	Trout Creek	Household	4	350	76	329
10587	493943.2	4320155	Teller	Trout Creek	Commercial	5	96	59	96
49371	493990.8	4320064	Teller	Trout Creek	Domestic	3	125	50	125
293822	494161.9	4320659	Teller	Trout Creek	Domestic Stock	9.8	520	72	488

294925	494465.4	4320728	Teller	Trout Creek	Domestic Stock	3	480	190	480
114241	494596.5	4320167	Teller	Trout Creek	Domestic	6	300	60	230
114241	494602.3	4320052	Teller	Trout Creek	Commercial	14	480	65	480
283316	494662.4	4320965	Teller	Trout Creek	Domestic Stock	2	880	251	870
10124	494777.7	4320713	Teller	Trout Creek	Commercial	2	345	87	345
142745	495028	4320168	Teller	Trout Creek	Domestic	0.5	320	100	213
55311	495509.8	4320166	Teller	Trout Creek	Domestic	1	420	300	420
264185	495743.5	4320134	Teller	Trout Creek	Household	1.5	500	34	500
47449	495910.5	4320247	Teller	Trout Creek	Domestic	0.75	500	43	500
81248	496014.2	4320144	Teller	Trout Creek	Household	3	400	92	393
28844	496240.4	4320185	Teller	Trout Creek	Domestic	1	300	85	299
126095	496149.7	4319871	Teller	Lovell Gulch	Household	12	640	75	430
92665	496144.1	4319758	Teller	Lovell Gulch	Domestic	3	400	120	400
83221	496020.9	4319605	Teller	Lovell Gulch	Household	1	685	100	457
153843	495967.5	4319423	Teller	Lovell Gulch	Domestic	7.2	700	141	668
136755	496167.8	4319301	Teller	Lovell Gulch	Household	10	80	12	51
65269	496353.5	4319113	Teller	Lovell Gulch	Household	2.5	108	55	102
162757	495757.1	4319269	Teller	Lovell Gulch	Household	0.5	450	111	430
162683	495893	4318829	Teller	Lovell Gulch	Household	7	140	35	128
66164	495801.6	4318827	Teller	Lovell Gulch	Household	4.5	185	125	185
62296	495697.3	4318781	Teller	Lovell Gulch	Municipal	50	600	60	600
17942	495621.2	4318748	Teller	Lovell Gulch	Municipal	8	85	23	41
111238	495184.9	4318568	Teller	Lovell Gulch	Household	3	300	190	200
265369	495007.5	4318781	Teller	Lovell Gulch	Domestic	15	300	128	300
17275	494853.5	4319161	Teller	Lovell Gulch	Domestic	1	325	250	325
136654	494629.4	4319464	Teller	Trout Creek	Domestic	9	280	125	187
136655	494409.8	4319339	Teller	Trout Creek	Domestic	15	480	85	320
214746	494255	4319298	Teller	Trout Creek	Monitoring well	11	652	90	652
251679	494714.2	4319700	Teller	Trout Creek	Domestic	10	500	212	478
164919	493762	4319904	Teller	Trout Creek	Household	2.5	300	45	285
184599	493835.4	4319630	Teller	Trout Creek	Household	1	360	107	348
150782	493998.9	4319721	Teller	Trout Creek	Household	1	297	87	283
170561	494099.1	4319865	Teller	Trout Creek	Household	5	420	30	410
87919	494120.1	4319737	Teller	Trout Creek	Household	2.5	250	90	230
8616	494216.8	4319765	Teller	Trout Creek	Domestic	6	185	130	185
156017	494313.4	4319844	Teller	Trout Creek	Household	5	360	90	280
115168	494359.7	4319865	Teller	Trout Creek	Household	1.5	350	140	345
93560	494405.5	4319951	Teller	Trout Creek	Household	1.3	250	53	245
27795	494585	4319905	Teller	Trout Creek	Domestic	2.5	360	120	359
8618	493008	4319766	Teller	Trout Creek	Domestic	20	155	130	155
64686	493248.7	4319765	Teller	Trout Creek	Industrial Municipal	104	50	0	29
32898	493429.4	4319366	Teller	Trout Creek	Monitoring well	90	140	21	?

62401	493604.9	4319165	Teller	Trout Creek	Industrial Municipal	90	140	12.5	16.4
233343	493537.7	4319181	Teller	Trout Creek	Monitoring well	NA	45	40	44
58168	493505.1	4319181	Teller	Trout Creek	Municipal	80	140	22	120
58167	493442.1	4319179	Teller	Trout Creek	Municipal	90	140	21.3	25.9
62681	493291.3	4319285	Teller	Trout Creek	Industrial Municipal	100	58	10	52
233313	493279.2	4319196.6	Teller	Trout Creek	Monitoring well	NA	100	40	99
116876	493147.3	4319097	Teller	Trout Creek	Household	13	63	35	63
56225	493902.1	4318515.1	Teller	Trout Creek	Municipal Irrigation	50	260	75	259
70379	493571	4318376.5	Teller	Trout Creek	Household	9	140	100	120
56228	493992.3	4318467.6	Teller	Trout Creek	Municipal Irrigation	40	300	70	299
37840	494269.4	4318565.6	Teller	Trout Creek	Monitoring well	NA	340	60	339
55763	494093.9	4318506	Teller	Trout Creek	Municipal Irrigation	68	340	62	170
62666	494166.4	4318407.5	Teller	Trout Creek	Industrial Municipal	100	300	55	299
10966	494049.8	4318275.1	Teller	Trout Creek	Commercial	2	100	65	100
56226	494022.6	4318206.5	Teller	Trout Creek	Municipal Irrigation	28	300	21	270
251887	494030.7	4318039	Teller	Trout Creek	Monitoring well	7	500	80	499
136531	494181.3	4318265.6	Teller	Trout Creek	Domestic	15	280	95	279
27327	494288.3	4318160.6	Teller	Trout Creek	Monitoring well	60	640	50	427
56224	494351.3	4318203.5	Teller	Trout Creek	Municipal Irrigation	35	640	32	300
266103	493710.7	4317734	Teller	Trout Creek	Domestic Stock	0.5	900	653	900
110153	493191.6	4318795.1	Teller	Trout Creek	Household	6	300	110	200
52518	493135.3	4318711.6	Teller	Trout Creek	Household	6	600	140	599
50199	493062.8	4318862.1	Teller	Trout Creek	Household	30	560	90	560
43245	493073.1	4318734.6	Teller	Trout Creek	Household	5	500	60	499
47722	493302.8	4318612.1	Teller	Trout Creek	Household	9	160	30	150
55281	493077.5	4318627.6	Teller	Trout Creek	Household	0.5	700	200	699
49196	492985	4318673.6	Teller	Trout Creek	Household	0.25	700	59	544
43689	493035.5	4318308.6	Teller	Trout Creek	Household	3	600	350	599
85091	493303.4	4318211.6	Teller	Trout Creek	Household	0.1	300	55	290
271111	493424.6	4317532	Teller	Trout Creek	Domestic Stock	0.5	1120	340	1120
10770	493029.9	4317448.5	Teller	Trout Creek	Commercial	2	93	58	93
247310	493310.9	4317081.5	Teller	Trout Creek	Monitoring well	1	1000	400	999
62299	494584.9	4318050.5	Teller	Loy Gulch	Municipal	90	580	21	300
62300	494841.7	4318138	Teller	Loy Gulch	Municipal	25	500	120	500
18457	495802.4	4317988.5	Teller	Loy Gulch	Domestic	15	140	110	140
253221	495919	4318108.6	Teller	Loy Gulch	Domestic	2	320	140	200

135476	495901.9	4318221	Teller	Loy Gulch	Household	5	240	70	240
102933	495913.3	4318246.6	Teller	Loy Gulch	Household	10	160	76	160
176416	496054	4318558.1	Teller	Loy Gulch	Household	1	500	100	499
138091	496074.2	4318325.1	Teller	Loy Gulch	Domestic	3	200	30	140
201359	496040.7	4318116.1	Teller	Loy Gulch	Household	2.5	400	108	390
93678	496026.1	4318100.5	Teller	Loy Gulch	Household	2	300	73	295
16586	496090.5	4318022.6	Teller	Loy Gulch	Domestic	1.25	640	100	640
171649	496085.1	4317797.6	Teller	Loy Gulch	Household	12	120	90	119
30	496597.3	4317503.5	Teller	Woodland Park	Domestic	30	250	155	250
96345	496052.2	4317088.6	Teller	Woodland Park	Household	2	320	153	213
282235	495933.7	4317256	Teller	Woodland Park	Household	10	260	130	260
105414	495835.5	4317443.1	Teller	Woodland Park	Household	4	300	180	280
192477	495680.8	4317288.6	Teller	Woodland Park	Household	5	400	90	399
195561	495563.3	4317256.6	Teller	Woodland Park	Household	1.25	420	180	420
26338	495438.4	4317255.1	Teller	Woodland Park	Domestic	2	400	140	380
262678	495620.9	4317403.5	Teller	Woodland Park	Household	3	330	130	325
48704	494928	4317547	Teller	Woodland Park	Domestic	1.5	300	115	200
6017	494347	4316928.1	Teller	Woodland Park	Domestic	4	138	110	138
10952	494090	4316450.5	Teller	Woodland Park	Commercial	8	311	97	252
8174	494770	4316527	Teller	Woodland Park	Domestic	6	138	122	138
120397	494786	4315475.5	Teller	Woodland Park	Domestic	1.5	450	130	450
2247	494814.3	4315725	Teller	Woodland Park	Domestic	1.5	220	125	220
49123	494998.9	4315920	Teller	Woodland Park	Commercial	7	170	110	170
300136	495029.6	4315967	Teller	Woodland Park	Monitoring well	NA	45	33	NA
300138	495021.5	4315985.5	Teller	Woodland Park	Monitoring well	NA	44.7	31.83	NA
300137	495044.7	4316013	Teller	Woodland Park	Monitoring well	NA	44.7	31.48	NA
3102	495192.1	4316129.5	Teller	Woodland Park	Municipal	55	130	94	130
1092	494440	4315323	Teller	Woodland Park	Domestic	2	200	100	200
296140	494680.2	4315289.5	Teller	Woodland Park	Household	2	420	120	420
137755	494310.7	4315199.5	Teller	Woodland Park	Household	0.2	560	149	550
10284	495817.3	4315704.5	Teller	Woodland Park	Irrigation	5	120	100	120
7	496679.6	4315973	Teller	Woodland Park	Domestic	20	202	166	183
209849	495152.5	4315429	Teller	Woodland Park	Household	3	400	95	399
210105	495080.3	4315337.5	Teller	Woodland Park	Household	4	400	190	390
135154	494727.5	4315199.5	Teller	Woodland Park	Household	0.5	350	190	350
184523	494647	4315055.5	Teller	Woodland Park	Household	2	400	95	99
192139	494672	4315017.5	Teller	Woodland Park	Household	1	500	260	450
192198	494667.9	4314956.5	Teller	Woodland Park	Household	2.75	500	100	470
36071	495086.7	4314317	Teller	Woodland Park	Domestic	4	520	140	280
251558	495198.9	4314433	Teller	Woodland Park	Household	2.5	500	95	499
36071	495316	4314485.5	Teller	Woodland Park	Household	3.9	500	90	490
100481	495604.1	4314124.4	Teller	Woodland Park	Household	1	320	109	213
221259	495553.9	4314066.4	Teller	Woodland Park	Household	2	500	180	500

105413	495583.4	4314020.9	Teller	Woodland Park	Household	1.5	320	135	312
264755	495664.3	4313914.5	Teller	Woodland Park	Household	1	500	100	500
91089	495787.8	4313808	Teller	Woodland Park	Household	0.5	380	80	360
225	495698.3	4313726.4	Teller	Woodland Park	Domestic	26	102	22	102
10754	496317	4314608	Teller	Woodland Park	Commercial	6.5	500	80	500
10754	496329	4314628	Teller	Woodland Park	Commercial	5	350	77	233
10754	496380	4314641	Teller	Woodland Park	Commercial	5	162	140	162
167300	496462.1	4314635	Teller	Woodland Park	Other	4	400	130	267
72371	496592.1	4314591	Teller	Woodland Park	Household	1.5	400	112	390
151941	494774.4	4315094	Teller	Woodland Park	Household	1	480	210	480
191774	494743.6	4314965	Teller	Woodland Park	Household	1.5	400	90	387
191788	494731.4	4314911	Teller	Woodland Park	Household	10	140	55	139
209430	494806.6	4315064	Teller	Woodland Park	Household	1.3	500	169	490
120573	494867.6	4315064	Teller	Woodland Park	Household	4	400	155	267
193394	494863.8	4314995	Teller	Woodland Park	Household	1	400	155	378
105909	494873.8	4314954	Teller	Woodland Park	Household	1	300	47	300
197655	494922.6	4315033	Teller	Woodland Park	Household	2.4	400	135	400
193393	494941.3	4314972	Teller	Woodland Park	Household	2	400	100	350
196639	494992.9	4315003	Teller	Woodland Park	Household	3	400	89	390
193392	495003.1	4314957	Teller	Woodland Park	Household	1.75	400	125	390
193391	495059.3	4314950	Teller	Woodland Park	Household	2	400	120	390
196636	495080.1	4314995	Teller	Woodland Park	Household	2	400	85	399
104311	495115.1	4314949	Teller	Woodland Park	Household	1.5	300	105	200
193395	495128.5	4314935	Teller	Woodland Park	Household	2	300	98	270
200078	495180.2	4314973	Teller	Woodland Park	Household	2	300	90	299
195848	495197.5	4314927	Teller	Woodland Park	Household	2	300	70	270
200080	495248.1	4314988	Teller	Woodland Park	Household	3.5	360	95	350
200076	495257.7	4314942	Teller	Woodland Park	Household	1.5	400	90	399
191775	494822.6	4314942	Teller	Woodland Park	Household	1.33	400	173	390
2248	494858.2	4314924	Teller	Woodland Park	Domestic	0.33	420	180	420
216003	494856.9	4314851	Teller	Woodland Park	Household	1	500	195	495
191776	494898.6	4314919	Teller	Woodland Park	Household	10	400	70	399
191787	494901.2	4314873	Teller	Woodland Park	Household	1.75	400	143	390
167488	494967.6	4314912	Teller	Woodland Park	Household	2	420	40	410
191786	494970.2	4314866	Teller	Woodland Park	Household	1.5	400	95	399
191777	495032.5	4314896	Teller	Woodland Park	Household	1.5	400	50	390
191785	495039.7	4314851	Teller	Woodland Park	Household	4	160	99	159
191784	495094.8	4314836	Teller	Woodland Park	Household	2.5	300	90	299
191778	495092.4	4314889	Teller	Woodland Park	Household	1.5	300	120	290
191783	495156.4	4314821	Teller	Woodland Park	Household	5	160	60	120
191779	495215.4	4314866	Teller	Woodland Park	Household	1.5	400	95	399
191782	495210.1	4314813	Teller	Woodland Park	Household	3	320	90	319
191780	495268	4314882	Teller	Woodland Park	Household	1.6	300	80	250
191781	495278.3	4314821	Teller	Woodland Park	Household	3	400	95	399
279365	495332.9	4315004	Teller	Woodland Park	Household	3	460	92	455

268131	495402.8	4315008	Teller	Woodland Park	Household	5.5	600	151	500
216289	495341.2	4314950	Teller	Woodland Park	Household	2	400	100	399
261769	495409.9	4314950	Teller	Woodland Park	Household	2	300	90	300
256902	495333	4314894	Teller	Woodland Park	Household	2	490	89	490
256679	495407.4	4314894	Teller	Woodland Park	Household	3	500	186	491
269508	495324.5	4314813	Teller	Woodland Park	Household	3.5	400	67	266
208421	495415.2	4314829	Teller	Woodland Park	Household	2	400	108	378
181585	495321.3	4314752	Teller	Woodland Park	Household	8.5	200	95	200
126899	495532.6	4315176	Teller	Woodland Park	Household	2	200	55	200
155044	495618.4	4315232	Teller	Woodland Park	Domestic	1.5	300	42	300
214400	495557.7	4315019	Teller	Woodland Park	Commercial	3	240	28	240
263465	495508.2	4314967	Teller	Woodland Park	Domestic	2.5	280	50	280
3954	495482.4	4314861	Teller	Woodland Park	Domestic	5	360	75	360
24288	495497.8	4314824	Teller	Woodland Park	Domestic	1	300	97	200
20350	495527.3	4314747	Teller	Woodland Park	Domestic	6	310	91	200
131391	495476.3	4314689	Teller	Woodland Park	Household	5	280	60	280
10958	495508.3	4314584	Teller	Woodland Park	Household	1.5	300	95	200
33602	495511	4314523	Teller	Woodland Park	Household	2	320	130	213
3783	495643.5	4314920	Teller	Woodland Park	Domestic	30	100	80	100
254254	495723.9	4314913	Teller	Woodland Park	Household	3	300	92	290
137781	495718.9	4314853	Teller	Woodland Park	Household	2.5	260	70	173
33795	495665.7	4314852	Teller	Woodland Park	Domestic	1	170	166	170
92605	495604.6	4314852	Teller	Woodland Park	Household	6	96	40	96
292375	495551.8	4314365	Teller	Woodland Park	Domestic	1.25	400	110	400
63183	495549.9	4314277	Teller	Woodland Park	Household	2	245	153	245
2063	495671.4	4314127	Teller	Woodland Park	Domestic	38	98	70	98
293480	495700.6	4314799	Teller	Woodland Park	Household	10	140	40	140
156016	495801.6	4314774	Teller	Woodland Park	Household	2.5	300	47	300
70166	495770.6	4314547	Teller	Woodland Park	Household	4.5	245	141	245
6965	495659.2	4314306	Teller	Woodland Park	Domestic	1	360	33	360
151713	495753	4314252	Teller	Woodland Park	Household	3	300	38	300
104785	495777.8	4314175	Teller	Woodland Park	Household	2	110	28	110
230121	495702.2	4315267	Teller	Woodland Park	Domestic	1	300	35	300
108916	495744.5	4315278	Teller	Woodland Park	Household	1.25	150	60	145
125679	495813.2	4315309	Teller	Woodland Park	Household	2	160	64	160
64734	495788.1	4315187	Teller	Woodland Park	Domestic	8	250	80	230
281786	495726	4315095	Teller	Woodland Park	Domestic	10	100	68	79
70807	495701.3	4315080	Teller	Woodland Park	Household	0.5	150	54	150
128283	495807.3	4315096	Teller	Woodland Park	Household	15	110	85	110
43840	495790.4	4315064	Teller	Woodland Park	Domestic	3	380	180	360
8935	496065.7	4314932	Teller	Woodland Park	Domestic	1	165	100	165
41442	495751.7	4314974	Teller	Woodland Park	Household	5	200	65	133
136217	495765.3	4314943	Teller	Woodland Park	Household	4	260	75	254
205202	495814.7	4314928	Teller	Woodland Park	Household	5.7	115	49	115
1000	496072.1	4314531	Teller	Woodland Park	Domestic	18	300	53	300

149383	496064.5	4314521	Teller	Woodland Park	Household	2	220	80	200
160611	495965	4314285	Teller	Woodland Park	Household	12	100	15	100
75948	495848.5	4314161	Teller	Woodland Park	Household	10	130	40	130
162546	495808.5	4314030	Teller	Woodland Park	Domestic	20	120	90	120
113287	495985.6	4314027	Teller	Woodland Park	Household	15	150	50	150
108921	495966.5	4313802	Teller	Woodland Park	Household	0.5	252	155	252
90668	495925.5	4313797	Teller	Woodland Park	Household	0.5	300	77	300
32129	496205.5	4313603	Teller	Woodland Park	Domestic	13	100	25	100
92842	496079.2	4313769	Teller	Woodland Park	Household	0.5	400	56	393
150453	495871.3	4313644	Teller	Woodland Park	Household	0.5	540	290	540
204107	495880.2	4313613	Teller	Woodland Park	Household	0.4	660	175	660
151945	495875.3	4313552	Teller	Woodland Park	Household	0.25	500	265	500
268693	495870.2	4313530	Teller	Woodland Park	Household	0.1	1100	300	1100
10920	496394.6	4313534	Teller	Woodland Park	Commercial	5	200	181	200
291899	496317.7	4313919	Teller	Woodland Park	Household	1	400	30	400
9600	496539	4314134	Teller	Woodland Park	Domestic	6	142	89	95
48822	496755.4	4314320	Teller	Woodland Park	Domestic	2	285	100	190
2787	496977.8	4314142	Teller	Woodland Park	Domestic	1	525	77	400
12689	496790.2	4312731	Teller	Woodland Park	Domestic	1	262	62	262
102004	497139.9	4312765	Teller	Crystola	Household	11	75	45	75
128451	497270.8	4312477	Teller	Crystola	Domestic	30	160	25	107
196811	497453.7	4312242.3	Teller	Crystola	Household	1	400	35	399
64791	497595	4312715	Teller	Crystola	Household	1.5	200	35	200
53306	497543	4311818.8	Teller	Crystola	Household	8	120	40	120
77996	497472	4311678.6	Teller	Crystola	Irrigation Domestic	5	240	30	239
48729	497335.3	4311754.3	Teller	Crystola	Household	0.2	580	470	580
53679	497255	4311594.3	Teller	Crystola	Household	1	440	180	440
42551	497159.8	4311708.3	Teller	Crystola	Household	9	90	75	83
194091	497170.9	4312201.9	Teller	Crystola	Household	0.5	500	110	499
267464	496999.6	4311897	Teller	Crystola	Household	3	380	51	380

Permit	UTM_x	UTM_y	County	Description	Well type	Yield (GPM)	TD (feet)	static water level (feet)	pumping level
5876	497803.2	4312204.8	El Paso	Crystola	Domestic	1	200	70	200
136391	498049	4312174	El Paso	Crystola	Household	2	820	200	550
208351	498030.6	4312132.3	El Paso	Crystola	Household	0.1	485	180	480
84819	498020.8	4312037.8	El Paso	Crystola	Household	0.2	500	250	333
208450	497955.3	4312130.3	El Paso	Crystola	Household	0.1	485	180	480
16087	497854.7	4312151.3	El Paso	Crystola	Domestic	2	96	78	96
202403	497869	4312010.3	El Paso	Crystola	Household	1.5	590	340	576
73528	497915.3	4311887.5	El Paso	Crystola	Household	0.5	300	62	200
128000	497755.6	4312051.8	El Paso	Crystola	Household	1	360	80	240

271430	497761.9	4312009.5	El Paso	Crystola	Commercial	0.25	400	116	395
139679	497735.1	4312002.3	El Paso	Crystola	Household	6	100	57	100
183765	497775.5	4311940.3	El Paso	Crystola	Household	12	140	70	139
87526	497777.9	4311844.5	El Paso	Crystola	Household	1	150	75	150
35760	497857.8	4311744.8	El Paso	Crystola	Domestic	50	100	40	45
35710	497927.8	4311460.3	El Paso	Crystola	Domestic	3	200	35	190
15811	510423.3	4301909.1	El Paso	West Colorado Springs	Stock	2	73	21	71
853	510635.8	4301327	El Paso	West Colorado Springs	Domestic	10	80	21	68
166837	507629.9	4301090	El Paso	Manitou Springs	Domestic	60	500	flowing	flowing
20244	509229.2	4301118	El Paso	Manitou Springs	Domestic	10	150	18	150
29083	509225	4300722	El Paso	Manitou Springs	Domestic	1	105	12	105
245371	508290	4300061	El Paso	Manitou Springs	Domestic Stock	4.5	340	145	340
22949	513685.7	4284635	El Paso	Rock Creek	Domestic	1	183	0	183
241094	512006	4281809	El Paso	Little Fountain Creek	Monitoring Well	1	1007	54	642
63987	512553	4281378	El Paso	Little Fountain Creek	Municipal	15	500	335	468
273099	511371	4280736	El Paso	Little Fountain Creek	Irrigation	5	544	0	520
20256	511785.9	4280579	El Paso	Little Fountain Creek	Domestic	5	220	17	200
246869	511848.5	4280599	El Paso	Little Fountain Creek	Monitoring Well	NA	2000	46	NA
63991	511875	4280376	El Paso	Little Fountain Creek	Municipal	17	100	17.5	25
287065	511894	4280035	El Paso	Little Fountain Creek	Monitoring Well	2.5	680	0	680
214414	511029.3	4280003	El Paso	Little Fountain Creek	Domestic	0.75	330	229	310
22152	511794.3	4279537	El Paso	Deadman Canyon	Domestic	1	512	165	512
22856	511384.3	4279569	El Paso	Deadman Canyon	Domestic	dry	300	dry	dry
23926	511400	4279165	El Paso	Deadman Canyon	Domestic	1	100	36	100
122273	511427.3	4278759	El Paso	Deadman Canyon	Domestic	1	180	10	180
77053	511188.5	4278736	El Paso	Deadman Canyon	Domestic Stock	6	398	7	398
25833	511381.6	4277827	El Paso	Little Turkey Creek	Domestic	3	400	94	350
12956	510934.8	4277500	El Paso	Little Turkey Creek	Stock	5	576	150	250
12632	510939.5	4277506	El Paso	Little Turkey Creek	Stock	9	326	70	195
98125	510887.5	4275528	El Paso	Little Turkey Creek	Household	0.25	170	30	145

214409	510590.8	4279443	El Paso	Little Turkey Creek	Domestic	1	470	221	470
207565	510614.6	4279240	El Paso	Little Turkey Creek	Household	10.7	384	92	300
214411	510528.3	4279140	El Paso	Little Turkey Creek	Domestic	60	455	301	455
207566	510456.3	4279061	El Paso	Little Turkey Creek	Domestic	1	450	216	450
179279	510549.6	4278549	El Paso	Little Turkey Creek	Domestic	5	500	410	460
94564	510401.2	4278512	El Paso	Little Turkey Creek	Stock	0.5	313	124	313
156289	510480.3	4278394	El Paso	Little Turkey Creek	Domestic	1	310	90	300
180530	510618.9	4278274	El Paso	Little Turkey Creek	Domestic	2	620	140	540
43918	510379.8	4278273	El Paso	Little Turkey Creek	Domestic	5	500	175	480
186506	510213.7	4278305	El Paso	Little Turkey Creek	Domestic Stock	6	560	275	450
64808	510187.8	4276096	El Paso	Little Turkey Creek	Other	30	1125	175.5	894.9
192132	509689.8	4274668	El Paso	Turkey Creek	Domestic	37	1020	0	1020
189652	509524.2	4274556	El Paso	Turkey Creek	Domestic	20	1070	0	1070
196571	508920.6	4274928	El Paso	Turkey Creek	Domestic	8	170	86	136
196571	508833.6	4274915	El Paso	Turkey Creek	Domestic	15	260	140	220
196320	508838	4274562	El Paso	Turkey Creek	Domestic	150	387	0	387
288195	509086.9	4274098	El Paso	Turkey Creek	Domestic Stock	15	185	70	180
232049	509098.3	4274001.9	El Paso	Turkey Creek	Domestic	10	605	370	420
188750	509034.7	4273672.9	El Paso	Turkey Creek	Domestic	100	745	0	500
191525	508581.9	4273910.4	El Paso	Turkey Creek	Domestic	30	470	0	470
204706	508216.5	4273926.9	El Paso	Turkey Creek	Domestic	60	258	0	172
217976	507935.3	4273563.9	El Paso	Turkey Creek	Domestic	30	510	345	507
47145	508255.3	4272860	El Paso	East Fork Red Creek	Commercial	63.7	617	-30.7	-18.2
181320	507544.8	4272806	El Paso	East Fork Red Creek	Monitoring Well	3	242	41	200
67871	507780	4272278	El Paso	East Fork Red Creek	Commercial	95	662	0	140
153150	507674.4	4271730	El Paso	East Fork Red Creek	Domestic	0.5	480	165	400
164079	507584	4271867	El Paso	East Fork Red Creek	Domestic	7	624	5	210
137081	507246.6	4272001	El Paso	East Fork Red Creek	Domestic	3	580	65	560
14470	508057.3	4270929	El Paso	East Fork Red Creek	Domestic Stock	5	285	50	250
708	507453.1	4270716	El Paso	East Fork Red Creek	Domestic	3	370	150	250
295832	507246.8	4270914	El Paso	East Fork Red Creek	Household	4	750	1	750
22950	506439.2	4270909	El Paso	East Fork Red Creek	Stock	1	346	6	346

180505	506515.6	4271148	El Paso	East Fork Red Creek	Domestic Stock	3	515	10	480
300516	506563	4271219	El Paso	East Fork Red Creek	Monitoring Well	10	640	300	640
180506	506582.4	4271451	El Paso	East Fork Red Creek	Domestic	6	500	15	499
167966	506043.5	4271407	El Paso	East Fork Red Creek	Domestic	15	157	0	105
172433	506146.1	4271556	El Paso	East Fork Red Creek	Domestic	30	130	33	55
178773	506328.4	4271824	El Paso	East Fork Red Creek	Domestic	15	260	35	173
182410	505872.8	4271448	El Paso	East Fork Red Creek	Domestic	1.5	227	40	220
201484	505761.1	4271232	El Paso	East Fork Red Creek	Domestic Stock	12	280	55	220
184010	505638.7	4271328	El Paso	East Fork Red Creek	Domestic Stock	15	217	28	205
18677	506842.6	4270907	El Paso	Red Creek	Stock	3	250	60	250
187614	506701.9	4270823	El Paso	Red Creek	Domestic	7	773	250	410
186071	506444.7	4270651	El Paso	Red Creek	Domestic	1.5	1250	1	801
288313	505932.5	4270331	El Paso	Red Creek	Domestic	8	800	225	800
239474	505919.5	4270490	El Paso	Red Creek	Domestic Stock	15	725	300	725
239480	506012.1	4270515	El Paso	Red Creek	Domestic Stock	15	750	100	750
22635	505635	4270931	El Paso	Red Creek	Stock	1	150	35	150
160929	505214.3	4270969	El Paso	Red Creek	Domestic Stock	7	528	6	105
265856	505086.1	4269515	El Paso	Red Creek	Household	20	777	450	777
18462	505689.7	4269812	El Paso	Red Creek	Stock	3	712	190	569
18627	505645.1	4269712	El Paso	Red Creek	Domestic	2	420	150	420
66253	505405.3	4269310	El Paso	Red Creek	Stock	0.3	300	15	290
18513	505649.2	4269306	El Paso	Red Creek	Domestic	20	266	240	244
9116	505653.2	4268900	El Paso	Red Creek	Domestic	1	143	142	143
46734	505834.7	4268596	El Paso	Red Creek	Domestic Stock	10	213	160	200
177178	509202.9	4264961	El Paso	Sullivan Park	Domestic	1	610	305	610
2021	509729.2	4264944	El Paso	Sullivan Park	Stock	20	255	70	190

Permit	UTM_x	UTM_y	County	Description	Well type	Yield (GPM)	TD (feet)	static water level (feet)	pumping level
21045	504848.6	4270145	Fremont	Red Creek	Domestic Stock	1	116	20	77
27146	504881	4270682	Fremont	Red Creek	Domestic	6	175	50	175
144184	504743.9	4270720	Fremont	Red Creek	Domestic	20	380	63	253
172427	504578.4	4270730	Fremont	Red Creek	Household	?	400	80	?
53897	504964.8	4270929	Fremont	Red Creek	Domestic Stock	5	544	40	450
142458	504074.6	4270463	Fremont	Red Creek	Domestic	5	305	75	300
67531	504694.2	4271423	Fremont	Red Creek	Household	0.3	220	70	147

77611	504682.6	4271324	Fremont	Red Creek	Household	0.3	130	65	87
202008	504221.4	4271414	Fremont	Red Creek	Domestic	6	280	30	260
203195	504039.2	4271240	Fremont	Red Creek	Domestic Stock	9	540	195	400
29563	504095.8	4271401	Fremont	Red Creek	Monitoring Well	1.5	380	75	375
218778	504024.2	4271652	Fremont	Red Creek	Domestic	1	600	280	540
254197	504388.2	4271772	Fremont	Red Creek	Domestic	1	860	195	620
238851	504450.9	4271992	Fremont	Red Creek	Domestic Stock	15	735	340	690
198343	504455.4	4272181	Fremont	Red Creek	Domestic	4	350	55	280
153621	504248.2	4272084	Fremont	Red Creek	Household	9	817	697	799
145513	504001.7	4271973	Fremont	Red Creek	Domestic	0.5	80	17	75
204758	503698.6	4271735	Fremont	Red Creek	Domestic	1	600	280	540
142148	503692.2	4270172	Fremont	Red Creek	Domestic Stock	3	265	180	240
142162	503357.2	4270217	Fremont	Red Creek	Domestic Stock	5.3	218	72	200
258342	503204.3	4269996	Fremont	Red Creek	Domestic Stock	4	460	175	307
152107	503956.8	4270487	Fremont	Red Creek	Domestic Stock	5	375	230	360
142147	503782.2	4270654	Fremont	Red Creek	Domestic Stock	3.5	240	125	220
142457	503295.1	4270576	Fremont	Red Creek	Domestic Stock	0.8	250	66	240
145921	503553.6	4270792	Fremont	Red Creek	Household	4	350	77	350
78919	503553.2	4270911	Fremont	Red Creek	Domestic	1	170	54	170
277872	503105.5	4270818	Fremont	Red Creek	Stock	6	220	35	210
154577	503355	4270957	Fremont	Red Creek	Domestic	5	220	50	200
133853	503781.1	4271069	Fremont	Red Creek	Household	7	250	110	250
205491	503598.1	4271168	Fremont	Red Creek	Domestic Stock	5	280	120	275
143083	503476.3	4271178	Fremont	Red Creek	Domestic Stock	3	275	100	260
231058	496950.8	4267457.5	Fremont	Beaver Creek	Domestic Stock	5	825	125	825
301360	496044.1	4266983	Fremont	Beaver Creek	Domestic	12	600	280	600
258730	496117.7	4266731.5	Fremont	Beaver Creek	Domestic	15	650	525	650
232438	495636.7	4266595.5	Fremont	Beaver Creek	Domestic Stock	5	750	695	750
235828	495445.4	4266321	Fremont	Beaver Creek	Domestic	9	725	675	725
243935	496783.9	4266224	Fremont	Beaver Creek	Domestic Stock	10	830	75	830
239797	496378.2	4266017.5	Fremont	Beaver Creek	Domestic Stock	15	775	75	745
232650	496023.5	4265535	Fremont	Beaver Creek	Domestic	5	800	150	800
260960	495730.1	4265877.5	Fremont	Beaver Creek	Domestic	16	858	200	858
245525	495515	4265793.5	Fremont	Beaver Creek	Domestic	10	825	250	825
264194	495289	4265765	Fremont	Beaver Creek	Domestic Stock	16	720	500	720
259968	495342.9	4265904	Fremont	Beaver Creek	Domestic	10	675	300	675
231252	495201.3	4265828	Fremont	Beaver Creek	Domestic Stock	16	450	250	450

232690	494297.5	4265353	Fremont	Beaver Creek	Domestic	15	475	140	440
231332	494817.1	4265305.5	Fremont	Beaver Creek	Domestic Stock	15	675	248	500
239464	495222.2	4265445.5	Fremont	Beaver Creek	Domestic Stock	10	560	78	560
235323	495522.3	4265377.5	Fremont	Beaver Creek	Domestic Stock	0.25	800	196	533
231333	495442.5	4265071.1	Fremont	Beaver Creek	Fire	12	525	225	510
244005	494540.1	4263430	Fremont	Soda Springs Park	Domestic Stock	15	1600	300	1600
244004	494355.8	4263399	Fremont	Soda Springs Park	Domestic Stock	15	1300	20	1300
145515	493793.7	4262965	Fremont	Soda Springs Park	Domestic Stock	5	100	20	90
198711	493636.2	4262184.1	Fremont	Soda Springs Park	Domestic	2.5	1000	300	1000
177055	493209.7	4262217	Fremont	Soda Springs Park	Domestic Stock	0.5	300	220	300
144837	492975	4262523.5	Fremont	Soda Springs Park	Domestic Stock	8	175	50	117
139419	492944.3	4262340.6	Fremont	Soda Springs Park	Domestic Stock	0.5	280	100	280
198133	492828.2	4261579.1	Fremont	Soda Springs Park	Domestic	10	1100	500	750
238690	491639.5	4261584.1	Fremont	Eightmile Creek	Domestic Stock	3	480	200	440
265610	491243.9	4261289	Fremont	Eightmile Creek	Domestic Stock	15	350	250	350
111242	491021.4	4261037	Fremont	Eightmile Creek	Domestic Stock	0.5	200	100	200
203732	490925	4261121	Fremont	Eightmile Creek	Domestic	15	275	200	275
138805	490922.1	4260866	Fremont	Eightmile Creek	Household	15	375	300	375
269635	490720	4260745	Fremont	Eightmile Creek	Domestic	15	275	150	275
116732	490824	4260408.1	Fremont	Eightmile Creek	Household	1	80	15	80
187494	491219.7	4259461.1	Fremont	Eightmile Creek	Domestic	4	147	15	146
50737	487221	4261887	Fremont	Sixmile Creek	Domestic Stock	50	350	12	233
15028	486807.9	4261630	Fremont	Sixmile Creek	Irrigation	300	1320	66	880
277392	480488	4267061	Fremont	Fourmile Creek	Domestic Stock	15	625	200	625
225839	479403.2	4268385	Fremont	Fourmile Creek	Domestic Stock	1	100	40	80
95524	479282.1	4268353	Fremont	Fourmile Creek	Domestic Stock	10	100	40	80
240932	478907.2	4267956	Fremont	Fourmile Creek	Domestic Stock	dry	dry	dry	dry
300770	478912.1	4268611	Fremont	Fourmile Creek	Domestic	10	500	0	500
259142	479011.6	4268915	Fremont	Fourmile Creek	Domestic	15	600	10	600

268111	479012.1	4269498	Fremont	Fourmile Creek	Domestic Stock	15	700	10	700
153560	481113.6	4267298	Fremont	Fourmile Creek	Domestic	dry	dry	dry	dry
229583	481944.8	4266994	Fremont	Felch Creek	Domestic	15	950	30	950
258805	482096.5	4267529	Fremont	Felch Creek	Domestic	3.3	972	67	606
238655	481928.9	4267944	Fremont	Felch Creek	Domestic	15	900	20	900
222927	482594.6	4267097	Fremont	Felch Creek	Domestic Stock	10	1100	200	840
261299	482546	4267815	Fremont	Felch Creek	Domestic Stock	dry	dry	dry	dry
226384	482811.7	4267631	Fremont	Felch Creek	Domestic	15	1050	240	1050
226383	483192.9	4267282	Fremont	Felch Creek	Domestic	3	165	112	120
231019	483231.5	4267416	Fremont	Felch Creek	Domestic Stock	4	220	70	220
231019	483335.2	4267655	Fremont	Felch Creek	Domestic	7.5	1400	120	650
252505	483484.1	4267456	Fremont	Felch Creek	Domestic Stock	1.25	350	25	350
270119	483495.6	4267471	Fremont	Felch Creek	Domestic Stock	12	220	25	210
231021	483200.4	4267862	Fremont	Felch Creek	Domestic	3	220	58	147
131590	481274	4268384	Fremont	Milsap Creek	Domestic Stock	2	250	100	167
134320	480826.8	4268677	Fremont	Milsap Creek	Domestic	3	560	10	373
245218	478823.3	4269907	Fremont	Fourmile Creek	Domestic	dry	dry	dry	dry
52066	479795.6	4270641	Fremont	Fourmile Creek	Domestic Stock	45	133	20	89
259302	480377.2	4271387	Fremont	Fourmile Creek	Domestic	15	675	10	675
95528	480287	4271553	Fremont	Fourmile Creek	Domestic	15	100	30	100
241587	480355	4271795	Fremont	Fourmile Creek	Domestic Stock	10	125	22	83
262959	480098	4271820	Fremont	Fourmile Creek	Domestic	9	600	190	480
241747	480059.3	4271759	Fremont	Fourmile Creek	Domestic	5	435	205	290
250653	480337.3	4272177	Fremont	Fourmile Creek	Domestic	15	330	70	220
225835	479534.4	4271883	Fremont	Fourmile Creek	Domestic	10	440	160	293
20911	480151.7	4272328	Fremont	Fourmile Creek	Domestic	5	342	105	170
241581	480296.2	4272785	Fremont	Fourmile Creek	Domestic Stock	15	160	75	140
241600	480018.7	4272732	Fremont	Fourmile Creek	Domestic	2	300	140	200
262175	479784	4272319	Fremont	Fourmile Creek	Domestic	1	365	180	365
282215	479608	4272419	Fremont	Fourmile Creek	Domestic Stock	15	400	100	400
231337	479600.5	4272747	Fremont	Fourmile Creek	Domestic	1	350	180	350
231337	479566.7	4272811	Fremont	Fourmile Creek	Domestic	15	700	200	700
239987	479181	4272554	Fremont	Fourmile Creek	Domestic	2	365	150	285

52067	478484.8	4271862	Fremont	Fourmile Creek	Domestic Stock	3	266	60	264
238676	478933	4272426	Fremont	Fourmile Creek	Domestic	3.5	300	80	200
239988	478834.3	4272476	Fremont	Fourmile Creek	Domestic	3	400	100	267
8724	476970.8	4266790	Fremont	Wilson Creek	Stock	15	70	15	70
222364	477231.7	4259838	Fremont	Sand Creek	Domestic	10	1025	170	1025
211089	477489.2	4260026	Fremont	Sand Creek	Domestic	0.5	100	10	90
224420	477565	4260290	Fremont	Sand Creek	Domestic	2	100	65	90
224421	477056.5	4260290	Fremont	Sand Creek	Domestic	0.5	400	240	390
273123	476759	4259762	Fremont	Threemile Park	Household	5	300	5	200
282985	476401	4259792	Fremont	Threemile Park	Household	10	340	260	340
235855	476625.5	4260377	Fremont	Threemile Park	Domestic	12	100	1	60
220217	476067.8	4260060	Fremont	Threemile Park	Household	15	175	170	175
222706	475919.8	4260389	Fremont	Threemile Park	Stock	15	220	50	200
150799	475645.2	4260389	Fremont	Threemile Park	Household	25	199	80	132
150798	475122.9	4260778	Fremont	Threemile Park	Household	10	132	125	132
42793	475928.2	4259580	Fremont	Ohio Canyon	Stock	1	81	10	54
211158	476784.9	4259587	Fremont	Sand Creek	Household	1	380	10	253
111851	476960.6	4258752	Fremont	Sand Creek	Domestic Stock	14	515	250	343
81774	477388	4258661.6	Fremont	Sand Creek	Domestic	11	400	370	400
44813	477478	4258392.1	Fremont	Sand Creek	Domestic	1	123	15	122
48452	477940.7	4255585.5	Fremont	Sand Creek	Domestic	15	40	16	30
226381	477630.9	4255455	Fremont	Sand Creek	Commercial	15	1000	100	1000
258033	487522.5	4261154	Fremont	Sixmile Creek	Domestic	10	150	35	150
122433	488215.1	4260555	Fremont	Sixmile Creek	Domestic	1	290	100	193

Permit	UTM_x	UTM_y	County	Description	Well type	Yield (GPM)	TD (feet)	static water level (feet)	pumping level
275466	494160	4227217	Custer	N Red Creek	Stock	10	600	1	600
167720	494568.8	4227200	Custer	N Red Creek	Stock	25	600	0	600
135749	494985.1	4224740	Custer	N Red Creek	Domestic Stock	12	100	45	66
219296	495996.7	4224111	Pueblo	Middle Red Creek	Domestic	14	905	248	666
22745	498130.4	4224039	Pueblo	Middle Red Creek	Commercial	250	285	?	?
277944	498203	4219897	Pueblo	Cooper Gulch	Domestic	4.4	200	116	145
68678	499171	4218979	Pueblo	North Creek	Commercial	379	886	53	620

91652	499761.2	4219041	Pueblo	North Creek	Domestic Stock	?	405	?	?
56511	499647.6	4217593	Pueblo	North Creek	Domestic	15	20	10	20
210543	499609.3	4217706	Pueblo	North Creek	Domestic Stock	10	644	226	591
278028	499312.5	4217499	Pueblo	North Creek	Domestic	3	100	8	100
54586	499724.2	4218590	Pueblo	North Creek	Commercial	15	40	8	40
114770	498670.6	4219263	Pueblo	North Creek	Domestic Stock	8	497	300	496
32729	498035.1	4219197	Pueblo	North Creek	Domestic	5	100	40	88
187002	498138.7	4218792	Pueblo	North Creek	Domestic	8	175	25	50
32727	497332.9	4218847	Pueblo	North Creek	Domestic Stock	2.6	250	130	200
32729	497384.8	4218654	Pueblo	North Creek	Domestic	8.75	233	61	231
210435	497382.8	4219024	Pueblo	North Creek	Domestic	20	221	159	210
20338	496368.4	4217626	Pueblo	North Creek	Domestic	1	91	57	91
121053	495614.4	4218659	Pueblo	North Creek	Household	10	100	40	66
161390	495321.7	4218504	Custer	North Creek	Household	0.5	172	9	164
119228	500170.6	4217586	Pueblo	North Creek	Household	15	700	1	700
153319	500535.4	4216432	Pueblo	North Creek	Domestic	15	145	15	128
176236	500901.4	4215955	Pueblo	North Creek	Domestic	10	248	1	247
206086	501369.8	4215730	Pueblo	North Creek	Domestic Stock	9	400	40	267
206085	501604	4215578	Pueblo	North Creek	Domestic Stock	9	108	50	107
75399	502166	4215363	Pueblo	North Creek	Household	7	300	110	200
294226	502137.8	4215225	Pueblo	North Creek	Household	6.25	260	4	214
190115	501896.4	4214763	Pueblo	Middle Creek	Domestic Stock	20	70	14	38
6685	502091.3	4214824.5	Pueblo	Middle Creek	Domestic	15	150	5	150
111164	502421.3	4214367	Pueblo	Middle Creek	Domestic	dry	dry	dry	dry
242931	501189.5	4215110	Pueblo	North Creek	Domestic Stock	15	1075	100	1075
22	501235.9	4214369.5	Pueblo	Beulah	Domestic Industrial	20	577	?	?
49334	500888.4	4214819	Pueblo	Beulah	Domestic	12	123	46	80
270278	500331	4213621	Pueblo	Beulah	Domestic Stock	2	475	150	460
279035	500002	4213427	Pueblo	Beulah	Domestic	10	450	200	450
270275	500614.3	4213327	Pueblo	Beulah	Domestic Stock	15	275	210	275
276061	500264.8	4212942.5	Pueblo	Beulah	Domestic Stock	15	300	235	280
8005	500995	4213797	Pueblo	Beulah	Domestic	6	50	30	50
23788	501250.3	4212722	Pueblo	Beulah	Domestic	15	100	12	21
232054	501965.5	4213814	Pueblo	Beulah	Household	15	125	20	125
155012	501796.7	4213422	Pueblo	Beulah	Household	15	123	15	82
6811	502679	4213728	Pueblo	Beulah	Domestic	12	65	10	65
11391	502867.2	4214374	Pueblo	Middle Creek	Domestic	30	295	250	280
149965	503030.4	4213756	Pueblo	Hogback Mountain	Commercial	7	50	6	47
222288	502199.3	4213005	Pueblo	Sugarloaf Mountain	Domestic	dry	dry	dry	dry
81631	501189.8	4212034	Pueblo	South Creek	Domestic	10	39	13	36
77298	500724.3	4211637	Pueblo	South Creek	Household	2.5	123	25	82
79672	500771.6	4211583	Pueblo	South Creek	Household	0.75	224	75	150
50187	500483.6	4211530	Pueblo	South Creek	Domestic	5	47	10	35

78015	500740.7	4211079	Pueblo	South Creek	Household	1.5	200	35	195
79890	500630.5	4210994	Pueblo	South Creek	Household	1	255	50	235
66954	500489.2	4211029	Pueblo	South Creek	Household	dry	dry	dry	dry
2365	500250.1	4210108	Pueblo	South Creek	Irrigation	25	457	?	?
95336	500518	4209941	Pueblo	South Creek	Domestic	8	100	15	65
276063	499741	4212845	Pueblo	South Creek	Domestic Stock	12	475	215	320

AQUAMAP DATA PART 2

Permit	well test	drawdown	specific capacity	Formation	FF top	FF bottom	Water Location	elevation	quad
260392	air lift	540	0.003	Precambrian	0	344	344	6560	virginia dale
30973	air	10	0.100	Fountain	0	TD	90	6600	virginia dale
200694	pump	463	0.016	Precambrian	0	20	400	6440	virginia dale
202244	pump	290	0.029	Precambrian	0	100	260	6440	virginia dale
286458	air lift	388	0.001	Precambrian	0	124	378	6600	virginia dale
199825	pump	195	0.036	Fountain	1	TD	350	6680	virginia dale
163182	pump	282	0.025	Fountain	0	TD	260	6600	virginia dale
295745	air lift	502	0.024	Precambrian	59	208	334	6800	virginia dale
244878	air lift	450	0.007	Precambrian	6	210	290	6840	virginia dale
233015	pump	195	0.018	Fountain	2	305		6880	virginia dale
266113	pump	315	0.028	Precambrian	0 `	130	290	6840	virginia dale
238723	pump	48	0.167	Fountain	1	207		6920	virginia dale
186494	pump	395	0.014	Precambrian	0	183	180	6800	virginia dale
276600	pump	204	0.020	Precambrian	0	144	627	6960	virginia dale
163182		282	0.025	Fountain	0	380	260	6700	table mountain
180879				Precambrian	2	33		7000	table mountain
176251		360	0.001	Fountain			40	5600	livermore
150293		580	0.071	Fountain	5	600	170	5800	livermore
150960		192	0.078	Fountain	12	200	170	5900	livermore
148227		10	0.800	Fountain	18	98	38	5900	livermore
150964		0	#DIV/0!	Precambrian	13	101		?	livermore
144003		145	0.021	Fountain	4	160	38	5900	livermore
183139		0	#DIV/0!	Precambrian	40	95	387	?	livermore
272137		0	#DIV/0!	Precambrian	0	165	56	?	livermore
270287		320	0.016	Fountain	15	740	365	5900	livermore
295801		370	0.027	Fountain	3	600	209	5900	livermore
293617		0	#DIV/0!	Precambrian	0	46	732	5900	livermore
234174		0	#DIV/0!	Precambrian	0	80	320	6000	livermore
74127		110	0.045	Fountain	15	140	100	6000	livermore
148765		-40	0.000	Precambrian	4	50	80	6000	livermore
213944		-13	0.000	Precambrian	16	160	247	6000	livermore
257601		-10	0.000	Precambrian	0	95	95	6000	livermore
78183		320	0.022	Fountain	4	655		6100	livermore
8334		144	0.014	Fountain				6100	livermore
85292		230	0.004	Fountain	16	250	75	6000	livermore
217928		145	0.097	Fountain	8	240	230	6000	livermore
91933		465	0.002	Fountain	16	356	185	6000	livermore
94831		110	0.182	Fountain	3	145	75	6000	livermore
262616		720	0.010	Precambrian	35	408	610	6000	livermore
235940		212	0.047	Fountain	9	260	90	6000	livermore

107128		139	0.025	Fountain	4	200		6000	livermore
51771		50	0.080	Fountain	10	190	160	6000	livermore
283259		340	0.021	Fountain	12	400	337	6000	livermore
141267		136	0.055	Fountain	0	210		6000	livermore
8276		6	3.000	Quaternary	22	36		6400	livermore
9164		1	15.000	Quaternary	28	36		6400	livermore
9164		28	0.536	Fountain	28	TD		6360	livermore mountain
283987	pump	298	0.034	Precambrian	0	52	264	5880	livermore mountain
29717		12	1.667	Quaternary	14	26	3	5880	livermore mountain
296105	pump	420	0.024	Fountain	0	TD	387	5880	livermore mountain
160969	pump	44	0.159	Fountain	0	TD		5940	livermore mountain
170533	pump	533	0.013	Fountain	6	505	180	5940	livermore mountain
55	bail	157	0.010	Fountain	24	175		6000	livermore mountain
164994	blow	188	0.064	Fountain	16	200	50	5880	livermore mountain
17799	bail	15	0.467	Fountain	0	TD		5920	livermore mountain
198077	air	110	0.064	Precambrian	1	56		5900	livermore mountain
71735	pump	84	0.048	Fountain	5	TD		5800	livermore mountain
67132	pump	25	0.400	Fountain	35	TD		5900	livermore mountain
78266	bail	10	1.000	Fountain	16	TD		5920	livermore mountain
184337		#VALUE!	#VALUE!	Fountain	4	204		5960	livermore mountain
178854	blow	250	0.003	Fountain	30	195	160	5840	livermore mountain
78827	blow	430	0.003	Fountain	6	TD	250	5880	livermore mountain
286	bail	47	0.021	Fountain	4	TD		5760	livermore mountain
6153		6	1.667	Fountain	3	NA		5200	laporte
12914		12	0.833	Fountain	1	NA		5000	laporte
14240		23	0.217	Fountain	9	NA		5000	laporte
38725		3	5.000	Fountain	1	NA	10	5000	laporte
49498		180	0.003	Fountain	30	NA		5400	laporte
54392		200	0.020	Fountain	5	NA	120	5300	laporte
54483		#VALUE!	#VALUE!	Fountain	35	NA		5400	laporte
66537		130	0.115	Fountain	18	NA	98-104	5400	laporte
66857		219	0.029	Fountain	23	NA	50	5400	laporte
68477		25	0.800	Fountain	10	36	18	5400	laporte
74367		392	0.001	Precambrian	5	70	230	5400	laporte
79953		375	0.003	Fountain	10	NA	195-200	5400	laporte
81972		147	0.061	Fountain	23	NA	148	5500	laporte

82877	277	0.025	Fountain	37	NA	220-260	5500	laporte
82878	75	0.100	Fountain	68	NA	140-460	5300	laporte
82878	380	0.004	Fountain	57	365	260	5500	laporte
87232	180	0.011	Fountain	58	135	90	5400	laporte
98764	618	0.010	Fountain	8	120	90	5500	laporte
104253	130	0.031	Fountain	4	NA	110	5300	laporte
126822	268	0.006	Fountain	10	210	60	5500	laporte
140795	101	0.020	Fountain	37	NA	178	5200	laporte
146329	43	0.349	Fountain	5	NA	49-83	5500	laporte
154316	127	0.118	Fountain	NA	NA		5400	laporte
161691	47	0.106	Fountain	50	NA	91-104	5400	laporte
172737	145	0.034	Fountain	NA	NA	175-240	5250	laporte
174441	418	0.002	Fountain	2	NA	200	5500	laporte
177156	260	0.031	Fountain	29	NA	268-273	5500	laporte
186079	164	0.061	Alluvium	91	143	55-85	5300	laporte
193763	470	0.010	Fountain	2	NA	300-420	5500	laporte
201569	357	0.001	Fountain	53	296		5400	laporte
203081	350	0.013	Fountain	0	290	160-290	5500	laporte
219827	158	0.051	Fountain	16	NA	172	5500	laporte
264990	10	4.700	Fountain	24	NA		5140	laporte
274739	225	0.064	Fountain	200	400	350-355	5300	laporte
293656	1.4	53.571	Alluvium	51	NA	11.5	5300	laporte
297041	900	0.011	Fountain	26	638	325-638	5400	laporte
7101	20	0.050	Fountain	25	80		5800	horsetooth reservoir
33910	280	0.018	Fountain	4	268	60	5800	horsetooth reservoir
40219	560	0.001	Fountain	180	600	180	5800	horsetooth reservoir
84870	5	0.400	Fountain	8	65	65	5600	horsetooth reservoir
127375	493	0.002	Precambrian	5	135	135	5500	horsetooth reservoir
133996	340	0.001	Fountain	6	560	180	5600	horsetooth reservoir
139845	240	0.025	Fountain	NA	NA	80	6000	horsetooth reservoir
141782	500	0.001	Fountain	35	450	400	5600	horsetooth reservoir
151133	410	0.007	Fountain	3	440	70	5600	horsetooth reservoir
153763	322	0.019	Fountain	NA	NA	12-640	5600	horsetooth reservoir
161546	660	0.006	Fountain	NA	NA	300	5500	horsetooth reservoir
163138	675	0.007	Precambrian	26	558	660	5600	horsetooth reservoir
164247	279	0.036	Fountain	15	270	195	5600	horsetooth reservoir
166498	335	0.022	Fountain	224	NA	365	5300	horsetooth reservoir

167578	307	0.033	Precambrian	5	135	245	5600	horsetooth reservoir
169122	551	0.001	Fountain	13	465	180-200	5800	horsetooth reservoir
169783	0	#DIV/0!	Fountain	81	455	410-455	5600	horsetooth reservoir
173825	240	0.029	Precambrian	0	298	362-374	5700	horsetooth reservoir
178157	292	0.005	Precambrian	37	243	243	6000	horsetooth reservoir
184958	624	0.007	Fountain	2	592		5600	horsetooth reservoir
198833	170	0.082	Fountain	NA	NA	37	5800	horsetooth reservoir
201345	357	0.020	Precambrian	12	256	6_12	6000	horsetooth reservoir
214349	490	0.020	Precambrian	13	55	55	5600	horsetooth reservoir
214931	560	0.001	Fountain	10	580	500	6000	horsetooth reservoir
227611	400	0.005	Fountain	20	NA	575	5700	horsetooth reservoir
252234	42	0.012	Precambrian	25	85	380-480	5600	horsetooth reservoir
267206	395	0.127	Precambrian	10	150	150-225	5600	horsetooth reservoir
204366	213	0.070	Fountain	2	175	35	6000	horsetooth reservoir
159296	363	0.001	Precambrian	17	75	325	5600	horsetooth reservoir
156209	520	0.006	Precambrian	6	440	520	5600	horsetooth reservoir
112675	420	0.010	Precambrian	3	73	431	5600	horsetooth reservoir
135305	248	0.060	Fountain	0	60	23	5800	horsetooth reservoir
133657	290	0.003	Fountain	23	NA	133	5800	horsetooth reservoir
164264	175	0.040	Fountain	14	NA	165-177	5800	horsetooth reservoir
157712	50	0.300	Fountain	295	NA	295-350	5800	horsetooth reservoir
183812	348	0.004	Fountain	261	NA	344-348	5800	horsetooth reservoir
161383	170	0.029	Fountain	12	NA	93-128	5800	horsetooth reservoir
173338	255	0.029	Fountain	10	NA	125	5800	horsetooth reservoir
173370	382	0.005	Fountain	7	180	50	6000	horsetooth reservoir
231105	443	0.017	Fountain	10	625	260	5800	horsetooth reservoir
17758	25	0.160	Fountain	25	65	17-25	6000	horsetooth reservoir
200643	470	0.003	Fountain	0	NA	396-437	6000	horsetooth reservoir
271821	456	0.016	Precambrian	0	310	310-700	6100	horsetooth reservoir

172804		389	0.001	Precambrian	12	342	368-372	6100	horsetooth reservoir
160924		245	0.020	Precambrian	25	420	420	6000	horsetooth reservoir
160924		250	0.002	Fountain	4	257	50	6000	horsetooth reservoir
171989		363	0.000	Fountain	178	NA	50	5800	horsetooth reservoir
171836		300	0.013	Fountain	NA	NA	351-357	5800	horsetooth reservoir
169784		370	0.014	Fountain	10	NA	290	6000	horsetooth reservoir
181643		5	2.000	Fountain	NA	NA		5800	horsetooth reservoir
184664		420	0.001	Fountain	6	260	240	6000	horsetooth reservoir
186271		345	0.043	Fountain	5	NA	80-90	5800	horsetooth reservoir
241992		160	0.044	Fountain	130	NA	120	5500	horsetooth reservoir
197357		167	0.024	Fountain	12	NA	40	5600	horsetooth reservoir
117779		275	0.004	Fountain	18	NA	75	5600	horsetooth reservoir
277609		275	0.004	Fountain	18	NA	75	5600	horsetooth reservoir
216144		400	0.002	Precambrian	12	365	400	5600	horsetooth reservoir
278065		77	0.130	Fountain	NA	NA		5600	horsetooth reservoir
278064		0	#DIV/0!	Fountain	NA	NA		5600	horsetooth reservoir
241270		695	0.001	Precambrian	14	270	660	5600	horsetooth reservoir
268890		577	0.026	Precambrian	12	360	500-540	5600	horsetooth reservoir
244242		40	0.368	Precambrian	15	540	680-740	5600	horsetooth reservoir
127375		395	0.015	Fountain	0	105	100	5500	horsetooth reservoir
133372		206	0.024	Fountain	12	140	65	5400	horsetooth reservoir
144204		135	0.037	Fountain	15	68	52-68	5400	horsetooth reservoir
218411	air lift	438	0.021	Precambrian	23	250	395	5560	buckhorn mountain
211309	air	272	0.006	Precambrian	9	52	127	5660	buckhorn mountain
138030	blow	610	0.005	Precambrian	3	60	650	5680	buckhorn mountain
143423	blow	560	0.001	Precambrian	6	75	200	5660	buckhorn mountain
179189	pump	591	0.000	Precambrian	0	85	220	5720	buckhorn mountain
78213	blow	72	0.042	Fountain	5	80	50	5600	buckhorn mountain
190311	air lift	352	0.000	Precambrian	0	300	430	5680	buckhorn mountain

248178	pump	300	0.017	Precambrian	0	30	400	5720	buckhorn mountain
141782		500	0.001	Fountain	35	450	400	5400	masonville
141792		460	0.002	Precambrian	35	400	350	5600	masonville
141939		225	0.044	Fountain	10	260	140	5440	masonville
167358		275	0.025	Precambrian	32	170		5400	masonville
155723		310	0.019	Precambrian	14	67	75	5400	masonville
147391		438	0.023	Fountain	26	500	467-469	5600	masonville
201982		245	0.024	Fountain	261	320	90	5600	masonville
243837		450	0.016	Fountain	270	560	270-560	5600	masonville
52862		295	0.010	Fountain	10	340	100	5600	masonville
266248		#VALUE!	#VALUE!	Fountain				5600	masonville
268931		423	0.007	Fountain	17	560	162	5600	masonville
221566		235	0.043	Fountain	85	380	100	5600	masonville
259990		348	0.043	Fountain	210	600	490	5600	masonville
219029		558	0.022	Precambrian	27	455	520	5400	masonville
276869		38	0.079	Fountain	6	120	88-109	5600	masonville
247508		395	0.038	Fountain	1	500	415	5600	masonville
61069		100	0.400	Precambrian	9	85	250	5400	masonville
70578		#VALUE!	#VALUE!	Precambrian	18	25		5400	masonville
47785		104	0.019	Precambrian	10	32		5400	masonville
83092		185	0.032	Fountain	24	215	153	5200	masonville
258756		45	0.333	Fountain	0	165	125	5200	masonville
23114		80	0.125	Fountain	36	80	65	5200	masonville
10723		15	0.133	Fountain	12	130		5400	masonville
8686		10	0.800	Fountain				5400	masonville
41466		75	0.040	Fountain	18	90	25	5400	masonville
8686		420	0.000	Precambrian	21	210	210	5400	masonville
157789		#VALUE!	#VALUE!	Precambrian	12	73			masonville
86126		170	0.012	Fountain	26	180	76	5400	masonville
189454		#VALUE!	#VALUE!	Precambrian	36	304			masonville
172066		330	0.015	Fountain	5	460		5400	masonville
172066		560	0.005	Precambrian	3	660	300	5400	masonville
187123		510	0.008	Fountain	5	365	390	5400	masonville
210076		449	0.018	Precambrian	1	450	40	5400	masonville
178580		370	0.038	Precambrian	6	285	310	5400	masonville
243264		425	0.012	Precambrian	8	120	120	5400	masonville
250696		600	0.008	Fountain	12	680	230	5500	masonville
40870		35	0.143	Fountain	41	70	65	5500	masonville
40872		35	0.429	Fountain	18	65	50	5500	masonville
222746		183	0.055	Fountain				5600	masonville
173033		430	0.012	Fountain			438	5600	masonville
192087		495	0.003	Fountain			450	5600	masonville
200899		355	0.014	Fountain			170	5600	masonville
251158		465	0.008	Fountain	32	500	120	5600	masonville

230065		500	0.014	Precambrian	0	535	575	5600	masonville
10168		65	0.015		22	140		5600	masonville
217720		535	0.015	Precambrian	1	465	580	5600	masonville
217721		323	0.023	Fountain	1	440	85	5600	masonville
176493	pump	360	0.008	Fountain	23	400	180	5400	carter lake
237991	pump	667	0.007	Fountain	?	?	690	6000	carter lake
230771	blow	450	0.020	Fountain	?	?	510	6000	carter lake
297060	blow	#VALUE!	#VALUE!	Ingleside	396	451	392	5800	carter lake
10726	pump	70	0.143	Fountain	?	?		5600	carter lake
89127	pump	300	0.010	Fountain	151	?	200		carter lake
67281	blow	465	0.017	Fountain	?	?	517		carter lake
207267	pump	180	0.039	Fountain	85	444	280		carter lake
200170	blow	220	0.005	Fountain			450		carter lake
200170	blow	778	0.008	Fountain			341		carter lake
221854	air	234	0.021	Fountain	73		370		carter lake
292078	air	100	0.160	Fountain	266		266		carter lake
267839	blow	148	0.338	Fountain	260		288		carter lake
177301	blow	370	0.019	Fountain	80		380		carter lake
124643	blow	274	0.128	Fountain	15		142		carter lake
214203	air	368	0.273	Fountain	373		260		carter lake
259203		241	0.041	Fountain					carter lake
192243		#VALUE!	#VALUE!	Fountain					carter lake
11095		50	0.080	Fountain					carter lake
193852	blow	422	0.009	Precambrian	0	76	236		carter lake
168188	air	252	0.013	Fountain	8		250		carter lake
144326	air	290	0.141	Fountain	425		425		carter lake
148662	air	344	0.058	Fountain	408		408		carter lake
248345	air	150	0.133	Fountain	355		475		carter lake
225628	blow	300	0.233	Fountain					carter lake
162579	air	320	0.094	Fountain					carter lake
224127	air	227	0.154	Fountain	345		475		carter lake
292829	air	305	0.033	Fountain					carter lake
240272	air	350	0.043	Fountain	360				carter lake
244821	air	40	1.000	Fountain					carter lake
244820	air	192	0.208	Fountain	375				carter lake
153300	air	545	0.001	Fountain					carter lake
245977	air	140	0.114	Fountain			450		carter lake
221573	air	295	0.203	Fountain			320		carter lake
187182	air	466	0.064	Fountain			220		carter lake
148344	blow	450	0.002	Precambrian	5	63	350		carter lake
270251	blow	500	0.600	Fountain	350		350		carter lake
230407		240	0.121	Fountain	3		330		carter lake
19279		#VALUE!	#VALUE!	Fountain	4		210		carter lake
228721		130	0.385	Fountain	2		60		carter lake

97619	bail	180	0.072	Fountain	0	TD		5920	pinewood lake
65155	air	396	0.003	Precambrian	0	280	140	5760	pinewood lake
132109	blow	382	0.002	Precambrian	23	77	77	5680	pinewood lake
150294	blow	407	0.002	Fountain	12	189	12	5680	pinewood lake
69717	pump	497	0.002	Fountain	28	160		5660	pinewood lake
254186	pump	140	0.036	Precambrian	0	26	334	5700	pinewood lake
230051	pump	322	0.016	Fountain	0	TD	260	5780	pinewood lake
81059	air	555	0.009	Precambrian	10	130	130	5700	pinewood lake
149591	pump	3	5.000	Quaternary	13	TD	12	5660	pinewood lake
98789	air	#VALUE!	#VALUE!	Precambrian	10	50	310	5640	pinewood lake
102072	blow	290	0.014	Precambrian	4	106	197	5680	pinewood lake
96715	blow	295	0.003	Fountain	8	TD	264	5640	pinewood lake
89854	pump	332	0.015	Fountain	18	TD	16	5640	pinewood lake
91943	pump	52	0.288	Precambrian	18	55	18	5620	pinewood lake
200311	pump	275	0.004	Fountain	5	274	5	5640	pinewood lake
200310	air lift	225	0.007	Fountain	20	TD	250	5640	pinewood lake
140371	blow	980	0.001	Precambrian	0	30	400	5700	pinewood lake
148222	pump	285	0.002	Fountain	16	TD	308	5600	pinewood lake
163589	air	195	0.103	Fountain	7	TD	165	5700	pinewood lake
153355	air	110	0.082	Fountain	2	TD	220	5700	pinewood lake
251767	air lift	300	0.007	Fountain	300	TD	540	5940	pinewood lake
294341	air lift	266	0.113	Fountain	0	TD	168	5680	pinewood lake
181329	air lift	324	0.056	Fountain	6	TD	353	5620	pinewood lake
181327	air lift	283	0.035	Fountain	12	TD	282	5600	pinewood lake
294290	air lift	506	0.001	Fountain	548?	TD	851	6040	pinewood lake
200692	air	498	0.000	Fountain	332	TD	500	6120	pinewood lake
180541	air lift	370	0.004	Fountain	390	TD	390	6560	pinewood lake
294340	air lift	210	0.071	Fountain	7	TD	168	5560	pinewood lake
246935	bailed	9	1.667	Quaternary	18	TD	13	5640	pinewood lake

33206	air lift	192	0.125	Fountain	17	155		5560	pinewood lake
222649	air lift	243	0.062	Precambrian	30	205	235	5560	pinewood lake
272521	pump	300	0.017	Precambrian	0	95		5580	pinewood lake
272455	pump	470	0.011	Precambrian	0	85	140	5640	pinewood lake
222283	pump	190	0.105	Precambrian	5	85	85	5620	pinewood lake
105680	pump	245	0.061	Fountain	19	228	13	5680	pinewood lake
243802	pump	330	0.021	Fountain	5	TD	500	5980	pinewood lake
258338	air lift	400	0.015	Precambrian	0	340	340	5760	pinewood lake
155433	blow	295	0.012	Precambrian	17	55		5820	pinewood lake
174677	pump	170	0.029	Precambrian	0	186	321	5820	pinewood lake
151255	blow	220	0.136	Fountain	1	TD	153	5940	pinewood lake
145769	blow	260	0.135	Fountain	8	TD	160	6000	pinewood lake
29450		130	0.023	Fountain	20	206	80	6640	pinewood lake
16042	bailed	55	0.036	Fountain	15	TD		6660	pinewood lake
183634	pump	349	0.086	Precambrian	4	250	4	6600	pinewood lake

Permit	well test	drawdown	specific capacity	Formation	FF top	FF bottom	Water Location	elevation	quad
219278	air lift	340	0.003	Precambrian	27	110	280	5720	pinewood lake
147490	pump	507	0.003	Precambrian	0	65		5800	pinewood lake
88548	pump	430	0.001	Fountain	400	TD	600	6120	pinewood lake
24916			#DIV/0!	Precambrian	0	70	70	5860	pinewood lake
12982		32	0.031	Fountain	1	220		5800	pinewood lake
218798	pump	479	0.002	Precambrian	2	390	385	5500	lyons
85682	bailer	60	0.250	Fountain	33	TD		5560	lyons
67997	air	387	0.008	Precambrian	16	65	65	5500	lyons
67193	bailer	15	1.000	Fountain	10	TD	30	5500	lyons
129973	blow	55	0.273	Fountain	38	80	45	5520	lyons
276006	air lift	495	0.003	Precambrian	50	185	185	5460	lyons
92264	bailer	42	0.238	Fountain	33	TD	33	5480	lyons
61102	bailer	80	0.063	Precambrian	40	80		5460	lyons
24826	bailer	81	0.123	Fountain	10	TD		5480	lyons
184025	blow	250	0.002	Fountain	400?	TD	480	5880	lyons
137500	pump	383	0.009	Fountain	400?	TD	11	5960	lyons
114555	pump	195	0.015	Fountain	400?	TD		5640	lyons
168268	pump	210	0.033	Fountain	471	TD	471	5700	lyons

176178	air lift	420	0.000	Fountain	310	TD	310	5760	lyons
293794	pump	140	0.036	Fountain	400?	TD	240	6160	lyons
96387	blow	520	0.000	Fountain	400?	TD	485	6160	lyons
78557	air	#VALUE!	#VALUE!	Lyons	648	TD		6200	lyons
175267	air lift	425	0.035	Fountain	300?	TD	640	6540	lyons
168781	air lift	320	0.022	Fountain	220	TD		6560	lyons
38529	bailer	85	0.059	Fountain	300?	TD	500	6480	lyons
214814	pump	260	0.000	Fountain	290	TD	290	6440	lyons
146518	blow	745	0.000	Fountain	300?	TD	500	6200	lyons
149205	blow	300	0.017	Fountain	300?	TD	390	6400	lyons
232980	air	10	1.500	Fountain	300?	TD	425	6320	lyons
170126	?	397	0.015	Fountain	300?	TD	445	6280	lyons
40037	bailer	100	0.080	Fountain	300?	TD	410	6040	lyons
232979	air	365	0.016	Fountain	300?	TD	255	6240	lyons
123593	air	125	0.120	Fountain	300?	TD		5560	lyons
84942	bailer	90	0.167	Fountain	30	TD	30	5420	lyons
19222	?	15	0.667	Quaternary	23	23		5460	lyons
205207	air	195	0.128	Fountain	3	TD	170	5660	lyons
195443	air lift	160	0.113	Fountain	0	TD	140	5520	lyons
195971	pump	21	0.633	Fountain	0	TD	210	5600	lyons
212127	pump	8	1.775	Fountain	0	TD		5620	lyons
59799	bailer	42	0.238	Fountain	32	TD	32	5580	lyons
194241	air lift	175	0.171	Fountain	0	TD	210	5580	lyons
193019	air lift	200	0.100	Fountain	0	TD	310	5560	lyons
88544	pump	190	0.079	Fountain	12	TD	120	5560	lyons
65272	bailer	100	0.100	Fountain	8	TD	8	5480	lyons
130179	pump	60	0.250	Fountain	50	TD	10	5460	lyons
102773	pump	87	0.086	Fountain	12	TD	12	5560	lyons
22935	bailed	125	0.016	Fountain	20	125		5540	lyons
970	air lift	100	0.090	Fountain	25	255	175	5480	lyons
85347	pump	100	0.150	Fountain	51	TD	51	5480	lyons
102789	pump	125	0.080	Fountain	12	TD	12	5620	lyons
83656	pump	487	0.031	Precambrian	15	260	470	5680	lyons
98	pump	5	3.000	Quaternary	18	TD		5680	lyons
96296	air	78	0.192	Fountain	10	TD	21	5560	lyons
114599	air	496	0.002	Precambrian	10	292	292	5580	lyons
66451	pump	60	0.250	Fountain	18	TD	18	5480	lyons
140556	air lift	74	0.541	Fountain	22	TD	24	5440	lyons
260899	air	138	0.109	Fountain	30	TD	55	5440	lyons
69411	bailer	90	0.167	Fountain	18	TD	18	5400	lyons
41821	air	351	0.028	Fountain	~300	TD	543	5740	lyons
64089	air	450	0.038	Fountain	~300	TD	420	5680	lyons
41820	pump	61	0.170	Ingleside	273	TD	265	5460	lyons
237448	pump	165	0.061	Fountain	0	TD		5440	lyons
157675	air lift	239	0.126	Fountain	56	TD	56	5400	lyons

22623	pump	93	1.075	Fountain	18	TD	30	5580	lyons
111390	blow	320	0.005	Fountain	~300	TD	170	5480	lyons
42227	air	115	0.017	Fountain	300	650	595	5920	lyons
170551	pump	67	0.060	Fountain	~300	TD	786	6160	lyons
217824	air lift	340	0.012	Fountain	310	TD	680	6160	lyons
166106	air	170	0.059	Fountain	565	TD	695	6160	lyons
170373	air lift	536	0.014	Fountain	~300	TD	795	6160	lyons
291188	air lift	90	0.094	Fountain	~300	TD	782	6120	lyons
268001	air lift	402	0.021	Fountain	~300	TD	345	6120	lyons
224736	air lift	310	0.029	Fountain	~300	TD	600	6040	lyons
172162	air lift	295	0.025	Fountain	~300	TD	568	6000	lyons
217674	air lift	300	0.018	Fountain	240	TD	730	6000	lyons
222269	air lift	360	0.056	Fountain	195	TD	570	6000	lyons
130062	pump	100	0.040	Fountain	~300	TD	7	6160	lyons
164682	air	227	0.026	Fountain	~100	TD	487	6040	lyons
198071	air lift	220	0.014	Fountain	0	TD	210	5860	lyons
202314	air lift	180	0.083	Fountain	27	TD	27	5820	lyons
157065	air	35	0.043	Fountain	18	TD	18	5760	lyons
146615	air	300	0.017	Fountain	~100	TD		5800	lyons
103472	blow	330	0.011	Fountain	314	TD	483	6080	lyons
146615	air lift	475	0.008	Fountain	~300	TD	420	6040	lyons
162696	air lift	240	0.029	Fountain	~300	TD	360	6000	lyons
114251	air	160	0.094	Fountain	312	TD	312	5920	lyons
188279	air lift	400	0.006	Fountain	295	TD	560	6040	lyons
115142	air	130	0.046	Fountain	480	TD	660	6140	lyons
138526	pump	296	0.027	Fountain	481	TD	93	6140	lyons
186666	air	225	0.013	Fountain	305	TD	560	6040	lyons
242958	air lift	425	0.005	Fountain	~300	TD	760	6040	lyons
178361	air lift	237	0.017	Fountain	~300	TD	591	6000	lyons
134119	air	245	0.020	Fountain	200	TD	470	5960	lyons
260348	air lift	410	0.071	Fountain	~300	TD	500	5960	lyons
135028	air	200	0.025	Fountain	~300	TD	340	5940	lyons
171172	air	314	0.019	Fountain	250	TD	380	5840	lyons
106037	blow	415	0.012	Fountain	~250	TD	269	5840	lyons
132550	bailer	80	0.001	Fountain	~250	TD		5820	lyons
134565	air	638	0.002	Precambrian	310	640	880	5720	lyons
119389	air	210	0.033	Fountain	0	TD	600	5560	lyons
220939	pump	114	0.049	Fountain	26	TD	240	6840	lyons
219879	pump	112	0.046	Fountain	4	TD	220	6680	lyons
219981	air lift	146	0.137	Fountain	0	TD	21	6160	lyons
12500	air	80	0.163	Fountain	2	195	110	5800	boulder
5535	air	400	0.010	Fountain	0	630	380	5720	boulder
31876	air	195	0.154	Fountain	16	TD	40	5480	boulder
10260	pump	147	0.027	Fountain	48	TD	60	5600	boulder
175774	air	430	0.003	Fountain	17	~375	50	5640	boulder

101992	air	390	0.008	Fountain	20	375	375	5640	boulder
166580	air	352	0.028	Fountain	0	TD	50	5680	boulder
25894	pump	213	0.012	Fountain	52	TD	350	5720	boulder
106928	air	395	0.004	Precambrian	23	40	225	5700	boulder
100845	air	735	0.000	Fountain	25	TD	40	6300	boulder
12821	air	45	0.111	Fountain	10	270	105	6080	boulder
67547	air	455	0.009	Precambrian	0	45	320	5920	boulder
170766	pump	315	0.022	Precambrian	0	194	194	5920	boulder
159272	air	378	0.005	Fountain	0	TD	50	5840	boulder
41784	air	84	0.036	Fountain	20	TD	35	5940	boulder
289320	air lift	354	0.025	Fountain	58	TD	197	5960	boulder
56728	air	169	0.024	Fountain	4	TD	76	5960	boulder
221729	air lift	540	0.004	Precambrian	27	230	120	5960	boulder
203493	air	385	0.013	Fountain	8	448	270	6100	boulder
15159	?	240	0.000	Fountain	30	550	398	6200	boulder
148030	blow	300	0.057	Fountain	~500	TD	100	6480	boulder
78147	air	123	0.008	Fountain	0	TD	245	6360	boulder
185673	air	#VALUE!	#VALUE!	Fountain	5	TD		6480	boulder
14463	air	#VALUE!	#VALUE!	Fountain	0	TD	265	6380	boulder
14463	pump	85	0.012	Fountain	20	TD	60	6400	boulder
47790	air	300	0.008	Fountain	0	TD	345	6420	boulder
11275	pump	46	0.022	Fountain	10	TD		6760	boulder
266243	air lift	294	0.019	Fountain	0	TD	436	6520	boulder
38144	pump	460	0.011	Fountain	0	TD		6680	boulder
38144	blow	525	0.002	Fountain	0	TD	310	6640	boulder
163058	blow	220	0.005	Fountain	9	TD	75	6520	boulder
25411	air	275	0.013	Fountain	10	TD	255	6480	boulder
63141	air	155	0.017	Precambrian	30	80	30	6520	boulder
282242	air lift	400	0.005	Fountain	8	380	250	6560	boulder
103230	air	665	0.000	Precambrian	0	330	330	6520	boulder
155918	air	385	0.013	Fountain	3	TD	100	6620	boulder
270260	air lift	565	0.006	Fountain	4	TD	100	6520	boulder
90871	blow	325	0.008	Precambrian	4	200	220	6700	boulder
89803	air	505	0.036	Precambrian	5	55	225	6700	boulder
127954	air	353	0.008	Fountain	2	TD	50	6560	boulder
72256	air	150	0.017	Fountain	22	128	48	6520	boulder
31770	air	5	0.200	Quaternary	15	TD	12	6420	boulder
103654	air	330	0.002	Precambrian	0	240	245	6420	boulder
148030	blow	480	0.013	Fountain	3	TD	480	6420	boulder
98556	air	#VALUE!	#VALUE!	Fountain	18	305	290	6360	boulder
81051	pump	219	0.007	Fountain	30	TD	30	6500	boulder
133089	air	535	0.006	Precambrian	14	265	490	6300	boulder
64938	air	93	0.016	Fountain	30	225	55	6440	boulder
65192	air lift	456	0.005	Precambrian	14	338	14	6280	boulder
149833	air	359	0.017	Precambrian	15	67	25	6300	boulder

62496	air	95	0.021	Precambrian	24	260	255	6240	boulder
165792	air	243	0.012	Fountain	6	TD	477	6320	boulder
132529	blow	230	0.030	Fountain	6	TD	180	6280	boulder
15969	pump	285	0.000	Precambrian	15	266		6200	boulder
64939	bailer	175	0.011	Fountain	14	TD		6200	boulder
150444	air	259	0.116	Fountain	27	TD	220	6160	boulder
170412	air	674	0.001	Precambrian	10	185	185	6400	boulder
159862	air	422	0.006	Fountain	19	TD	485	6300	boulder
160041	air	566	0.004	Fountain	0	TD	200	6400	boulder
169590	air	358	0.112	Fountain	5	TD	70	5880	boulder
160859	air	420	0.012	Fountain	4	TD	81	5840	boulder
162205	air	308	0.049	Fountain	8	TD	125	5920	boulder
155998	air	380	0.005	Fountain	8	TD	58	5820	boulder
160004	air	440	0.006	Fountain	0	TD	75	5840	boulder
150968	air	210	0.048	Fountain	6	TD	40	5860	boulder
157699	air	37	0.324	Fountain	8	TD	90	5860	boulder
161298	air	405	0.009	Fountain	10	285	75	5800	boulder
233088	air	112	0.065	Fountain	25	TD	42	6240	eldorado springs

Permit	well test	drawdown	specific capacity	Formation	FF top	FF bottom	Water Location	elevation	quad
10467	air	25	0.160	Fountain	0	TD	44	6720	eldorado springs
183639	air	225	0.044	Fountain	3	TD	190	6780	eldorado springs
132718	air	210	0.005	Precambrian	1	90	1075	8240	eldorado springs
72226	air	143	0.035	Precambrian	40	205	220	6650	ralston buttes
67546	bailer	190	0.037	Fountain	10	TD	105	6775	ralston buttes
11877	pump	235	0.026	Fountain	30	TD		6800	ralston buttes
45022	air	180	0.050	Fountain	28	TD	180	6700	ralston buttes
53597	air	109	0.055	Fountain	30	TD	165	6940	ralston buttes
13439	air	245	0.069	Precambrian	80	TD	125	7000	ralston buttes
28408	air	164	0.006	Fountain	2	TD	160	7130	ralston buttes
38979	air	79	0.127	Precambrian	8	80	200	7180	ralston buttes
116029	air	588	0.005	Fountain	10	TD	575	7420	ralston buttes
208002	air	205	0.005	Fountain	3	?	90	6400	ralston buttes
207274	air	954	0.004	Precambrian	0	490	360	6450	ralston buttes
276872	air	695	0.005	Precambrian	0	490	560	6480	ralston buttes
212705	air	705	0.006	Precambrian	10	625	115	6280	ralston buttes
33176	air	245	0.004	Precambrian	6	875	475	6250	ralston buttes
230737	air	244	0.012	Fountain	27	270	200	6300	ralston buttes
229358	air	405	0.247	Precambrian	30	285	275	6370	ralston buttes
11234	bailer	275	0.007	Fountain	5	TD		6350	golden
229760	air	395	0.051	Fountain	~300	TD	150	6170	golden
204552	pump	300	0.013	Fountain	28	TD	480	6300	golden
29702	pump	6	2.333	Fountain	4	TD		6200	golden

17380	NA	#VALUE!	#VALUE!	Fountain	16	TD	380	6190	golden
883	pump	13	0.769	Fountain	0	TD		6150	golden
883	air	123	0.098	Fountain	0	TD		6100	golden
249390	air	534	0.006	Precambrian	17	410	410	6040	golden
302208	NA	#VALUE!	#VALUE!	Fountain	12	TD		6000	morrison
302209	NA	#VALUE!	#VALUE!	Fountain	28	TD		6000	morrison
62709	air	238	0.504	Precambrian	21	315	342	6060	morrison
7767	air	143	0.084	Fountain	37	110		6260	morrison
231	?	#VALUE!	#VALUE!	Fountain	~300	TD		6160	morrison
7784	bailed	184	0.054	Fountain	23	TD		6240	morrison
15081	bailed	600	0.008	Fountain	~570	TD		6400	morrison
47951	air	46	0.326	Fountain	12	TD	70	6240	morrison
56900	pump	20	0.100	Fountain	40	TD		6240	morrison
2163	air	983	0.001	Fountain	2	TD	350	6200	morrison
76308	pump	290	0.014	Fountain	55	TD	225	6160	morrison
201433	air	375	0.040	Fountain	~300	TD		6140	morrison
52581	air	342	0.006	Fountain	13	TD	266	6120	morrison
214108	air	1090	0.008	Precambrian	0	625	140	6080	morrison
26357	air	143	0.021	Fountain	6	TD		6080	morrison
1341	bailed	20	0.005	Fountain	11	TD		6000	morrison
122641	air	290	0.002	Fountain	15	TD	100	5920	morrison
95085	air	395	0.010	Fountain	~145	TD	270	5900	morrison
86764	air	167	0.012	Fountain	~300	TD		5940	morrison
83497	air	335	0.012	Fountain	~300	TD	310	5970	morrison
147686	air	225	0.011	Fountain	260	TD	75	5940	morrison
146695	air	545	0.003	Precambrian	10	600	545	6080	morrison
117878	air	645	0.001	Precambrian	12	480	200	6080	morrison
270057	air	863	0.001	Fountain	18	TD	280	6080	morrison
65004	bail	360	0.001	Fountain	6	TD	233	6120	morrison
68895	pump	187	0.027	Fountain	~10	TD		6060	morrison
82555	air	327	0.012	Precambrian	18	360	500	6070	morrison
155870	air	220	0.007	Fountain	20	350	145	5980	morrison
238652	air	378	0.005	Fountain	2	TD	125	5980	morrison
85100	air	500	0.002	Fountain	14	TD	150	6010	morrison
35685	bail	460	0.002	Fountain	33	TD	40	6220	morrison
160131	pump	510	0.003	Fountain	0	TD	630	6180	morrison
72225	air	355	0.007	Fountain	4	345	110	6160	morrison
79782	air	405	0.001	Fountain	0	510	250	6140	morrison
213242	air	1118	0.001	Precambrian	0	725	725	6120	morrison
27276	air	25	0.080	Fountain	39	TD	50	6110	morrison
168147	air	615	0.011	Fountain	16	TD	60	6100	morrison
150557	air	120	0.125	Fountain	15	TD	40	6080	morrison
84408	air	525	0.004	Fountain	50	TD	150	6060	morrison
93166	air	100	0.005	Fountain	20	TD	38	6020	morrison
42396	air	270	0.002	Fountain	0	TD	95	6040	morrison

96974	air	84	0.012	Fountain	20	TD	20	6040	morrison
24223	air	720	0.001	Fountain	45	TD	460	6120	morrison
146764	air	190	0.004	Fountain	0	TD	635	6340	morrison
188451	air	421	0.011	Fountain	~300	TD	32	5980	morrison
271997	air	665	0.003	Fountain	~320	TD	240	6080	morrison
119138	air	135	0.007	Fountain	~300	TD	148	6080	morrison
11770	air	310	0.003	Fountain	~10	TD		6100	morrison
293802	air	475	0.003	Fountain	0	TD	22	6040	morrison
147626	air	580	0.002	Fountain	39	560		6160	morrison
51487	air	450	0.002	Fountain	17	TD		6160	morrison
294376	air	560	0.007	Fountain	33	TD	198	6040	morrison
293801	air	51	0.029	Fountain	~300	TD	349	6080	morrison
6510	air	236	0.148	Fountain	20	TD		6150	morrison
33745	pump	400	0.018	Precambrian	3	360	442	6200	morrison
91121	?	500	0.008	Fountain	~0	TD		6140	morrison
150394	air	420	0.036	Fountain	0	705	400	6140	morrison
107109	air	320	0.094	Fountain	20	TD	105	6140	morrison
11138	?	70	0.086	Fountain	55	TD		6100	morrison
31990	pump	450	0.000	Fountain	78	530	350	6040	morrison
287399	pump	145	0.081	Fountain	1	635	49	6040	indian hills
35628	pump	40	0.075	Fountain	15	TD	90	5920	indian hills
55282	air	100	0.100	Fountain	3	TD	355	6020	indian hills
152	bailer	18	0.056	Fountain	0	TD		6300	indian hills
137154	air	760	0.007	Fountain	6	775	300	6290	indian hills
143025	air	140	0.036	Fountain	0	TD	82	6240	indian hills
235200	air	1051	0.005	Fountain	126	TD		6120	indian hills
9135	pump	75	0.080	Fountain	7	TD	90	6000	indian hills
37733	air	555	0.005	Fountain	24	TD		6030	indian hills
12417	air	11	0.182	Fountain	~300	TD		6100	indian hills
27001	bailer	57	0.002	Fountain	50	TD	48	6060	indian hills
20902	?	155	0.484	Fountain	~50	TD		6180	indian hills
131231	air	340	0.194	Fountain	30	TD	78	6150	indian hills
77909	?	409	0.034	Fountain	~30	TD		6180	indian hills
63124	air	79	0.044	Fountain	2	TD		6180	indian hills
103087	air	285	0.053	Fountain	0	TD		5940	indian hills
91257	air	250	0.020	Fountain	0	455	280	5900	indian hills
108478	pump	450	0.004	Fountain	0	TD		5860	indian hills
90541	pump	463	0.004	Fountain	50	600	320	5820	indian hills
90540	air	720	0.006	Precambrian	0	570	530	6010	indian hills
36686	air	140	0.021	Fountain	18	TD	164	5940	indian hills
91258	pump	635	0.003	Fountain	18	TD	245	5880	indian hills
101658	pump	344	0.003	Fountain	31	TD	189	5860	indian hills
141318	pump	636	0.003	Fountain	35	TD	375	5840	indian hills
132461	air	603	0.004	Fountain	14	TD	308	5840	indian hills
100562	air	270	0.007	Fountain	6	TD	310	5860	indian hills

150635	air	492	0.005	Fountain	0	TD	550	5820	indian hills
133288	pump	609	0.003	Fountain	16	TD	150	5820	indian hills
136642	air	395	0.004	Fountain	0	TD	550	5800	indian hills
137015	pump	475	0.004	Fountain	0	TD	560	5840	indian hills
66361	air	165	0.024	Fountain	2	TD	130	5840	indian hills
144301	pump	534	0.002	Fountain	17	TD	290	5820	indian hills
98682	air	500	0.004	Fountain	0	TD	410	5880	indian hills
123967	bailer	239	0.003	Fountain	5	TD		5880	indian hills
91422	air	245	0.018	Fountain	0	TD	180	5840	indian hills
100587	pump	485	0.008	Fountain	4	TD	364	5840	indian hills
92707	air	408	0.010	Fountain	28	TD	392	5740	indian hills
136106	air	#VALUE!	#VALUE!	Fountain	0	TD		5820	indian hills
63846	pump	420	0.005	Fountain	0	TD	490	5860	indian hills
52953	pump	316	0.002	Fountain	17	TD		5840	indian hills
179511	NA	#VALUE!	#VALUE!	Fountain	1	TD		5850	littleton
166157	NA	#VALUE!	#VALUE!	Fountain	10	TD		5850	littleton
166160	NA	#VALUE!	#VALUE!	Fountain	7	TD		5950	littleton
166158	NA	#VALUE!	#VALUE!	Fountain	2	TD		5930	littleton
166161	NA	#VALUE!	#VALUE!	Fountain	20	TD		5970	littleton
166173	NA	#VALUE!	#VALUE!	Fountain	25	TD		6055	littleton
166175	NA	#VALUE!	#VALUE!	Fountain	22	TD		6065	littleton
166176	NA	#VALUE!	#VALUE!	Fountain	27	TD		6085	littleton
166151	NA	#VALUE!	#VALUE!	Fountain	8	TD		6080	littleton
166164	NA	#VALUE!	#VALUE!	Fountain	40	TD		6050	littleton
166163	NA	#VALUE!	#VALUE!	Fountain	22	TD		6035	littleton
166152	NA	#VALUE!	#VALUE!	Fountain	18	TD		6020	littleton
209389	NA	#VALUE!	#VALUE!	Fountain	17	TD		5710	kassler
76878	NA	90	0.178	Fountain	~20	TD		5660	kassler
124705	NA	#VALUE!	#VALUE!	Fountain	42	TD		5720	kassler
34562	NA	#VALUE!	#VALUE!	Fountain	23	TD		5620	kassler
34554	NA	#VALUE!	#VALUE!	Fountain	33	TD		5600	kassler

Permit	well test	drawdown	specific capacity	Formation	FF top	FF bottom	Water Location	elevation	quad
27664	pump	250	0.020	Fountain	8	TD	98	6100	kassler
218140	air	485	0.021	Fountain	60	505	70	6320	kassler
161922	bailer	55	0.055	Fountain	83	TD	60	6420	kassler
149776	air	26	0.577	Fountain	1	TD	27	6600	dawson butte
46467	NA	#VALUE!	#VALUE!	Fountain	48	TD		6560	dawson butte
48448	pump	26	4.615	Quaternary	46	TD		6440	larkspur
48447	pump	22	5.227	Quaternary	56	TD	2	6440	larkspur
31608	bailer	15	0.533	Fountain	32	TD	42	6460	larkspur
36894	bailer	65	0.077	Fountain	48	TD	38	6540	larkspur
63681	bailer	68	0.029	Fountain	60	TD	60	6480	larkspur

260455	bailer	119	0.017	Fountain	18	TD		6520	larkspur
51970	bailer	40	0.050	Fountain	23	TD	23	6560	larkspur
19546	pump	35	0.857	Fountain	38	TD	23	6540	larkspur
33853	bailer	35	0.571	Fountain	18	TD	33	6500	larkspur
213322	bailer	25	0.800	Fountain	5	TD	215	6540	larkspur
269006	air	113	0.265	Fountain	14	TD	140	6540	larkspur
28109	air	170	0.012	Fountain	8	TD	305	6580	larkspur
267374	air	451	0.011	Fountain	0	TD	125	6640	larkspur
17358	NA	#VALUE!	#VALUE!	Fountain	~10	TD		6560	larkspur
162146	bailer	80	0.075	Fountain	42	TD	27	6560	larkspur
162145	bailer	19	0.263	Quaternary	29	34	20	6560	larkspur
18565	NA	#VALUE!	#VALUE!	Fountain	~30	TD		6540	larkspur
162905	bailer	165	0.042	Fountain	28	TD	33	6520	larkspur
154472	bailer	9	3.333	Quaternary	60	TD		6520	larkspur
154473	bailer	40	0.125	Fountain	9	TD	65	6560	larkspur
267377	air	241	0.062	Fountain	2	TD	168	6640	larkspur
153952	air	319	0.016	Fountain	2	TD	312	6560	larkspur
267378	air	443	0.451	Fountain	32	TD	430	6560	larkspur
21988	bailer	38	0.211	Fountain	32	TD	10	6680	larkspur
267376	air	623	0.002	Fountain	1	TD		6660	larkspur
64623	bailer	144	0.010	Fountain	60	TD	60	6700	larkspur
27935	bailer	#VALUE!	#VALUE!	Fountain	18	TD		7640	dakan mountain
21664	bailer	37	0.541	Fountain	32	TD	16	7720	dakan mountain
94073	air	128	0.008	Fountain	0	TD	140	7720	dakan mountain
45458	air	62	0.065	Fountain	0	TD	60	7680	dakan mountain
194239	air	180	0.056	Fountain	0	TD		7660	dakan mountain
171188	pump	345	0.025	Fountain	110	TD	105	7640	dakan mountain
197223	air	220	0.123	Fountain	0	TD		7640	dakan mountain
172163	air	209	0.010	Fountain	5	TD	80	7600	dakan mountain
56406	pump	147	0.010	Fountain	30	205	150	7620	dakan mountain
151799	pump	145	0.034	Fountain	0	TD	80	7600	dakan mountain
188940	pump	230	0.017	Fountain	0	180	35	7620	dakan mountain
199135	pump	160	0.019	Fountain	10	220	155	7600	dakan mountain

Permit	well test	drawdown	specific capacity	Formation	FF top	FF bottom	Water Location	elevation	quad
122564	pump	20	0.150	Fountain	0	TD	250	7900	mount deception

52029	pump	60	0.005	Leadville Limestone	0	95	210	8000	mount deception
183817	pump	152	0.030	Fountain	5	TD	45	7960	mount deception
35	bailer	58	0.116	Fountain	20	TD		7960	mount deception
156364	air	176	0.017	Fountain	0	TD	185	8000	mount deception
138530	pump	140	0.107	Fountain	10	TD	30	7960	mount deception
107937	air	143	0.010	Fountain	17	TD	240	7960	mount deception
118235	air	150	0.007	Fountain	7	TD	280	8000	mount deception
31217	NA	#VALUE!	#VALUE!	Fountain	60	TD	60	8040	mount deception
268058	air	300	0.009	Fountain	0	TD		8040	mount deception
130087	air	218	0.023	Fountain	0	TD	35	8020	mount deception
78659	bailer	176	0.006	Fountain	10	TD		8000	mount deception
109698	air	250	0.008	Fountain	7	TD	350	7960	mount deception
144322	pump	275	0.007	Fountain	3	TD	220	8020	mount deception
1993	pump	8	3.500	Fountain	48	TD		8080	mount deception
86707	bailer	140	0.004	Fountain	10	TD	10	8000	mount deception
31217	pump	269	0.008	Fountain	7	TD	770	7980	mount deception
190928	air	110	0.045	Fountain	20	TD	186	7960	mount deception
147783	pump	287	0.010	Fountain	0	TD	80	7980	mount deception
138988	air	270	0.007	Fountain	0	TD	180	7980	mount deception
119577	pump	270	0.007	Fountain	10	TD	120	7980	mount deception
150480	pump	200	0.010	Fountain	14	TD	100	8020	mount deception
68206	air	520	0.010	Fountain	20	TD	390	7940	mount deception
93203	air	38	0.395	Fountain	0	TD		7860	mount deception
116378	air	46	0.261	Fountain	3	TD	35	7880	mount deception
116150	air	197	0.005	Fountain	40	TD	35	7880	mount deception
115195	air	115	0.070	Fountain	35	TD	80	7840	mount deception
174857	pump	38	0.184	Fountain	10	TD	35	7880	mount deception
535	air	47	0.213	Fountain	19	TD		7760	mount deception
70575	pump	105	0.095	Fountain	6	227	190	7760	mount deception

12132	air	80	0.750	Fountain	20	TD	80	7780	mount deception
44333	bailer	97	0.010	Fountain	0	TD		7800	mount deception
15401	air	115	0.652	Fountain	15	TD	135	7800	mount deception
25353	air	145	0.828	Fountain	7	TD	135	7800	mount deception
8479	pump	35	0.286	Fountain	24	TD		7850	mount deception
58770	pump	36	0.417	Fountain	49	440		8240	mount deception
147784	pump	153	0.131	Fountain	40	TD	215	8240	mount deception
27044	air	15	0.133	Fountain	39	TD		7840	mount deception
152227	air	165	0.006	Fountain	0	TD	155	8000	mount deception
231705	pump	212	0.021	Fountain	0	TD		7960	mount deception
39898	air	120	0.013	Fountain	0	210	150	8160	mount deception
119999	pump	248	0.008	Fountain	10	TD	223	8000	mount deception
134013	air	57	0.105	Fountain	0	TD	30	8000	mount deception
32796	air	338	0.022	Fountain	13	TD		8040	mount deception
194020	air	310	0.004	Fountain	0	TD		8160	mount deception
111687	air	118	0.008	Fountain	22	TD	20	8060	mount deception
92000	pump	222	0.002	Fountain	0	TD		8060	mount deception
93105	air	94	0.011	Fountain	25	TD	30	8100	mount deception
173570	air	120	0.083	Fountain	0	TD	110	8160	mount deception
162938	air	134	0.112	Fountain	30	TD	70	8200	mount deception
169803	pump	215	0.015	Fountain	3	TD		8280	mount deception
177801	pump	275	0.005	Fountain	15	TD	310	8400	mount deception
283313	pump	450	0.007	Fountain	10	TD		8500	mount deception
94292	pump	103	0.001	Fountain	15	TD	202	8440	mount deception
33071	bailer	5	1.200	Fountain	0	TD		8280	mount deception
104118	pump	117	0.015	Fountain	0	TD	118	8240	mount deception
96632	air	48	0.250	Fountain	0	TD	40	8210	mount deception
89749	pump	108	0.009	Fountain	0	TD	80	8200	mount deception
52528	pump	228	0.013	Fountain	0	TD	85	8180	mount deception

12740	pump	24	1.250	Fountain	20	TD		8180	mount deception
41302	pump	105	0.105	Fountain	12	TD	70	8140	mount deception
64500	pump	63	0.063	Fountain	15	TD	45	8160	mount deception
18796	pump	112	0.045	Fountain	18	TD	55	8120	mount deception
113630	air	93	0.054	Fountain	20	TD	115	8180	mount deception
164111	pump	165	0.036	Fountain	0	TD	115	8210	mount deception
43815	air	345	0.020	Precambrian	6	245		8240	mount deception
43813	pump	75	0.027	Fountain	0	TD		8260	mount deception
43814	pump	50	0.040	Fountain	0	TD		8260	mount deception
58017	air	345	0.020	Precambrian	6	245		8260	mount deception
64428	bailer	#VALUE!	#VALUE!	Fountain	20	TD	140	8240	mount deception
51359	pump	183	0.005	Fountain	0	TD	130	8240	mount deception
9721	pump	120	0.025	Fountain	50	TD		8260	mount deception
28543	bailer	1	6.000	Fountain	30	TD	56	8260	mount deception
12917	bailer	67	0.134	Fountain	0	TD		8260	mount deception
170600	pump	253	0.016	Fountain	13	TD	81	8280	mount deception
10587	bailer	37	0.135	Fountain	19	TD		8300	mount deception
49371	air	75	0.040	Fountain	0	TD	75	8320	mount deception
293822	pump	416	0.024	Fountain	0	TD		8400	mount deception
294925	air	290	0.010	Fountain	0	TD		8440	mount deception
114241	pump	170	0.035	Fountain	0	TD	125	8420	mount deception
114241	pump	415	0.034	Fountain	0	TD		8380	mount deception
283316	pump	619	0.003	Fountain	0	TD		8480	mount deception
10124	pump	258	0.008	Fountain	12	TD	87	8460	mount deception
142745	air	113	0.004	Fountain	0	TD	130	8470	mount deception
55311	air	120	0.008	Fountain	12	TD	247	8560	mount deception
264185	pump	466	0.003	Fountain	0	TD		8580	mount deception
47449	pump	457	0.002	Fountain	0	TD		8580	mount deception
81248	air	301	0.010	Fountain	70	TD	100	8600	mount deception

28844	air	214	0.005	Fountain	2	TD	150	8660	mount deception
126095	air	355	0.034	Fountain	50	560	180	8700	mount deception
92665	air	280	0.011	Fountain	50	TD		8720	mount deception
83221	air	357	0.003	Fountain	0	TD	290	8700	mount deception
153843	pump	527	0.014	Fountain	0	700	50	8620	mount deception
136755	pump	39	0.256	Fountain	30	TD	30	8640	mount deception
65269	pump	47	0.053	Fountain	20	TD	91	8660	mount deception
162757	pump	319	0.002	Fountain	60	TD	240	8640	mount deception
162683	air	93	0.075	Fountain	35	TD	60	8520	mount deception
66164	air	60	0.075	Fountain	15	TD	85	8520	mount deception
62296	air	540	0.093	Fountain	70	TD		8500	mount deception
17942	pump	18	0.444	Fountain	60	TD	50	8480	mount deception
111238	air	10	0.300	Fountain	70	TD	285	8460	mount deception
265369	pump	172	0.087	Fountain	0	TD		8480	mount deception
17275	bailer	75	0.013	Fountain	133	TD		8520	mount deception
136654	air	62	0.145	Fountain	0	TD	140	8400	mount deception
136655	air	235	0.064	Fountain	0	TD	130	8340	mount deception
214746	air	562	0.020	Fountain	20	TD	90	8300	mount deception
251679	pump	266	0.038	Fountain	40	480	265	8500	mount deception
164919	pump	240	0.010	Fountain	0	TD	175	8240	mount deception
184599	pump	241	0.004	Fountain	0	TD	120	8280	mount deception
150782	pump	196	0.005	Fountain	0	TD	155	8320	mount deception
170561	pump	380	0.013	Fountain	0	TD	80	8340	mount deception
87919	pump	140	0.018	Fountain	0	250	125	8320	mount deception
8616	pump	55	0.109	Fountain	45	TD	130	8340	mount deception
156017	pump	190	0.026	Fountain	2	TD	163	8360	mount deception
115168	pump	205	0.007	Fountain	3	TD	270	8360	mount deception
93560	pump	192	0.007	Fountain	0	TD	150	8380	mount deception
27795	air	239	0.010	Fountain	0	TD	270	8420	mount deception

8618	pump	25	0.800	Fountain	35	TD		8160	mount deception
64686	pump	29	3.586	Fountain	20	TD	25	8160	mount deception
32898	NA	#VALUE!	#VALUE!	Fountain	~20	TD		8160	mount deception
62401	air	3.9	23.077	Fountain	15	TD	40	8180	mount deception
233343	air	4	#VALUE!	Fountain	0	TD	40	8160	mount deception
58168	pump	98	0.816	Fountain	10	TD	75	8160	mount deception
58167	air	4.6	19.565	Fountain	15	TD		8140	mount deception
62681	pump	42	2.381	Fountain	3	TD	37	8160	mount deception
233313	air	59	#VALUE!	Fountain	3	TD	39	8160	mount deception
116876	air	28	0.464	Fountain	45	TD	45	8240	mount deception
56225	air	184	0.272	Fountain	5	TD	80	8280	mount deception
70379	bailer	20	0.450	Fountain	60	TD	110	8300	mount deception
56228	air	229	0.175	Fountain	10	TD	77	8260	mount deception
37840	air	279	#VALUE!	Fountain	5	TD	120	8300	mount deception
55763	pump	108	0.630	Fountain	5	TD	120	8260	mount deception
62666	air	244	0.410	Fountain	0	TD	50	8280	mount deception
10966	air	35	0.057	Fountain	19	TD		8300	mount deception
56226	pump	249	0.112	Fountain	23	TD	60	8300	mount deception
251887	air	419	0.017	Fountain	0	TD	135	8320	mount deception
136531	air	184	0.082	Fountain	0	TD	120	8290	mount deception
27327	air	377	0.159	Fountain	0	TD		8300	mount deception
56224	pump	268	0.131	Fountain	10	TD	65	8300	mount deception
266103	air	247	0.002	Fountain	0	TD	750	8440	mount deception
110153	air	90	0.067	Fountain	38	TD	190	8290	mount deception
52518	air	459	0.013	Fountain	12	TD	150	8300	mount deception
50199	air	470	0.064	Fountain	37	TD		8280	mount deception
43245	air	439	0.011	Fountain	0	TD	450	8320	mount deception
47722	pump	120	0.075	Fountain	10	TD	55	8200	mount deception
55281	air	499	0.001	Fountain	45	TD	540	8300	mount deception

49196	air	485	0.001	Fountain	0	TD	350	8360	mount deception
43689	air	249	0.012	Fountain	35	TD		8240	mount deception
85091	bailer	235	0.000	Fountain	50	TD		8320	mount deception
271111	air	780	0.001	Fountain	5	TD		8600	mount deception
10770	pump	35	0.057	Fountain	22	TD		8480	mount deception
247310	air	599	0.002	Fountain	10	TD		8440	mount deception
62299	pump	279	0.323	Fountain	0	TD	160	8320	mount deception
62300	air	380	0.066	Fountain	0	TD	285	8340	mount deception
18457	bailer	30	0.500	Fountain	50	TD	110	8480	mount deception
253221	air	60	0.033	Fountain	0	TD		8500	mount deception
135476	pump	170	0.029	Fountain	65	TD	65	8510	mount deception
102933	air	84	0.119	Fountain	58	TD	138	8520	mount deception
176416	air	399	0.003	Fountain	110	TD	470	8560	mount deception
138091	pump	110	0.027	Fountain	120	TD	95	8540	mount deception
201359	pump	282	0.009	Fountain	60	TD	170	8500	mount deception
93678	pump	222	0.009	Fountain	75	TD	175	8500	mount deception
16586	pump	540	0.002	Fountain	0	TD		8500	mount deception
171649	air	29	0.414	Fountain	0	TD	90	8500	mount deception
30	bailer	95	0.316	Fountain	1	TD		8720	mount deception
96345	air	60	0.033	Fountain	0	TD	160	8500	mount deception
282235	pump	130	0.077	Fountain	8	TD	115	8500	mount deception
105414	bailer	100	0.040	Fountain	20	TD	130	8460	mount deception
192477	air	309	0.016	Fountain	0	TD	210	8500	mount deception
195561	air	240	0.005	Fountain	0	TD		8520	mount deception
26338	pump	240	0.008	Fountain	10	TD	235	8480	mount deception
262678	air	195	0.015	Fountain	0	TD		8460	mount deception
48704	air	85	0.018	Fountain	30	TD	175	8380	mount deception
6017	pump	28	0.143	Fountain	35	TD		8460	mount deception
10952	pump	155	0.052	Fountain	0	TD	97	8560	woodland park

8174	pump	16	0.375	Fountain	4	TD	122	8500	woodland park
120397	pump	320	0.005	Fountain	4	TD	223	8520	woodland park
2247	pump	95	0.016	Fountain	40	TD	125	8520	woodland park
49123	bailer	60	0.117	Fountain	12	TD	150	8470	woodland park
300136	NA	#VALUE!	#VALUE!	Quaternary	40	TD	33.22	8470	woodland park
300138	NA	#VALUE!	#VALUE!	Quaternary	36	TD	32.33	8470	woodland park
300137	NA	#VALUE!	#VALUE!	Fountain	21	TD	31.48	8470	woodland park
3102	pump	36	1.528	Fountain	5	TD	94	8470	woodland park
1092	pump	100	0.020	Fountain	0	TD		8720	woodland park
296140	air	300	0.007	Fountain	0	TD		8520	woodland park
137755	pump	401	0.000	Precambrian	0	400	200	8840	woodland park
10284	bailer	20	0.250	Fountain	27	TD	27	8390	woodland park
7	pump	17	1.176	Fountain	0	TD		8580	woodland park
209849	air	304	0.010	Fountain	0	TD	230	8470	woodland park
210105	pump	200	0.020	Fountain	10	TD	355	8470	woodland park
135154	pump	160	0.003	Fountain	1	TD	190	8500	woodland park
184523	air	4	0.500	Fountain	0	TD	170	8560	woodland park
192139	pump	190	0.005	Fountain	5	TD	250	8540	woodland park
192198	pump	370	0.007	Fountain	0	TD	130	8520	woodland park
36071	bailer	140	0.029	Fountain	0	TD	140	8520	woodland park
251558	air	404	0.006	Fountain	5	TD	275	8430	woodland park
36071	pump	400	0.010	Fountain	0	TD	140	8380	woodland park
100481	air	104	0.010	Fountain	20	TD	200	8340	woodland park
221259	pump	320	0.006	Fountain	48	TD		8380	woodland park
105413	pump	177	0.008	Fountain	0	TD	145	8380	woodland park
264755	air	400	0.003	Fountain	40	TD		8360	woodland park
91089	bailer	280	0.002	Fountain	20	TD	80	8320	woodland park
225	pump	80	0.325	Fountain	5	TD		8400	woodland park
10754	air	420	0.015	Fountain	0	TD		8260	woodland park

10754	air	156	0.032	Fountain	0	TD	140	8260	woodland park
10754	pump	22	0.227	Fountain	18	TD		8280	woodland park
167300	pump	137	0.029	Fountain	10	TD	120	8360	woodland park
72371	pump	278	0.005	Fountain	15	TD	150	8340	woodland park
151941	air	270	0.004	Fountain	0	TD		8500	woodland park
191774	pump	297	0.005	Fountain	35	TD	285	8500	woodland park
191788	air	84	0.119	Fountain	5	TD	105	8500	woodland park
209430	pump	321	0.004	Fountain	5	TD	260	8480	woodland park
120573	air	112	0.036	Fountain	0	TD	160	8460	woodland park
193394	pump	223	0.004	Fountain	5	TD	270	8470	woodland park
105909	pump	253	0.004	Fountain	0	TD	220	8470	woodland park
197655	pump	265	0.009	Fountain	0	TD	290	8440	woodland park
193393	pump	250	0.008	Fountain	3	TD	200	8460	woodland park
196639	pump	301	0.010	Fountain	3	TD	290	8440	woodland park
193392	pump	265	0.007	Fountain	5	TD	225	8450	woodland park
193391	pump	270	0.007	Fountain	10	TD	250	8440	woodland park
196636	air	314	0.006	Fountain	10	TD	310	8420	woodland park
104311	air	95	0.016	Fountain	5	TD	180	8420	woodland park
193395	pump	172	0.012	Fountain	4	TD	210	8420	woodland park
200078	air	209	0.010	Fountain	15	TD	250	8420	woodland park
195848	pump	200	0.010	Fountain	50	TD	110	8420	woodland park
200080	pump	255	0.014	Fountain	30	TD	230	8400	woodland park
200076	air	309	0.005	Fountain	5	TD	220	8400	woodland park
191775	pump	217	0.006	Fountain	3	TD	270	8470	woodland park
2248	air	240	0.001	Fountain	0	TD		8470	woodland park
216003	air	300	0.003	Fountain	0	TD		8470	woodland park
191776	air	329	0.030	Fountain	5	TD	220	8460	woodland park
191787	pump	247	0.007	Fountain	0	TD	235	8460	woodland park
167488	pump	370	0.005	Fountain	5	TD	265	8460	woodland park

191786	air	304	0.005	Fountain	0	TD	235	8460	woodland park
191777	pump	340	0.004	Fountain	5	TD	240	8450	woodland park
191785	air	60	0.067	Fountain	25	TD	120	8450	woodland park
191784	air	209	0.012	Fountain	5	TD	90	8440	woodland park
191778	pump	170	0.009	Fountain	5	TD		8430	woodland park
191783	pump	60	0.083	Fountain	5	TD	245	8420	woodland park
191779	air	304	0.005	Fountain	2	TD	175	8420	woodland park
191782	air	229	0.013	Fountain	15	TD	250	8420	woodland park
191780	pump	170	0.009	Fountain	10	TD	210	8400	woodland park
191781	air	304	0.010	Fountain	5	TD	265	8420	woodland park
279365	air	363	0.008	Fountain	23	TD		8380	woodland park
268131	air	349	0.016	Fountain	1	TD		8380	woodland park
216289	air	299	0.007	Fountain	1	TD	175	8380	woodland park
261769	air	210	0.010	Fountain	0	TD		8380	woodland park
256902	air	401	0.005	Fountain	31	TD		8380	woodland park
256679	pump	305	0.010	Fountain	31	TD		8370	woodland park
269508	air	199	0.018	Fountain	6	TD	314	8400	woodland park
208421	pump	270	0.007	Fountain	0	TD	270	8380	woodland park
181585	air	105	0.081	Fountain	0	TD		8400	woodland park
126899	air	145	0.014	Fountain	0	TD	140	8380	woodland park
155044	pump	258	0.006	Fountain	0	TD	180	8360	woodland park
214400	pump	212	0.014	Fountain	0	TD		8360	woodland park
263465	air	230	0.011	Fountain	5	TD		8360	woodland park
3954	air	285	0.018	Fountain	0	TD		8360	woodland park
24288	air	103	0.010	Fountain	3	TD	105	8360	woodland park
20350	air	109	0.055	Fountain	0	TD	100	8340	woodland park
131391	pump	220	0.023	Fountain	0	TD	245	8360	woodland park
10958	air	105	0.014	Fountain	0	TD	245	8340	woodland park
33602	air	83	0.024	Fountain	0	TD	160	8320	woodland park

3783	pump	20	1.500	Fountain	5	TD		8320	woodland park
254254	pump	198	0.015	Fountain	5	TD	175	8320	woodland park
137781	air	103	0.024	Fountain	0	TD	160	8320	woodland park
33795	pump	4	0.250	Fountain	10	TD		8320	woodland park
92605	bailer	56	0.107	Fountain	0	TD		8320	woodland park
292375	air	290	0.004	Fountain	0	TD		8300	woodland park
63183	air	92	0.022	Fountain	5	TD	174	8320	woodland park
2063	pump	28	1.357	Fountain	5	TD	80	8300	woodland park
293480	air	100	0.100	Fountain	0	TD		8300	woodland park
156016	pump	253	0.010	Fountain	2	TD	165	8280	woodland park
70166	air	104	0.043	Fountain	9	TD	197	8280	woodland park
6965	pump	327	0.003	Fountain	3	TD	145	8280	woodland park
151713	pump	262	0.011	Fountain	0	TD	100	8250	woodland park
104785	air	82	0.024	Fountain	0	TD	78	8260	woodland park
230121	air	265	0.004	Fountain	0	TD		8330	woodland park
108916	pump	85	0.015	Fountain	0	TD	50	8330	woodland park
125679	air	96	0.021	Fountain	30	TD	80	8330	woodland park
64734	pump	150	0.053	Fountain	10	TD	180	8320	woodland park
281786	pump	11	0.909	Fountain	10	TD		8320	woodland park
70807	air	96	0.005	Fountain	0	TD	70	8320	woodland park
128283	air	25	0.600	Fountain	20	TD	80	8300	woodland park
43840	bailer	180	0.017	Fountain	50	TD	100	8300	woodland park
8935	pump	65	0.015	Fountain	20	TD		8300	woodland park
41442	air	68	0.074	Fountain	0	TD	50	8300	woodland park
136217	pump	179	0.022	Fountain	5	TD	90	8300	woodland park
205202	pump	66	0.086	Fountain	19	TD		8290	woodland park
1000	pump	247	0.073	Fountain	9	TD		8240	woodland park
149383	air	120	0.017	Fountain	3	TD		8240	woodland park
160611	air	85	0.141	Fountain	3	TD	30	8220	woodland park

75948	air	90	0.111	Fountain	0	TD	45	8240	woodland park
162546	bailer	30	0.667	Fountain	18	TD		8240	woodland park
113287	air	100	0.150	Fountain	0	TD	65	8200	woodland park
108921	air	97	0.005	Fountain	17	TD	75	8220	woodland park
90668	air	223	0.002	Fountain	0	TD	125	8240	woodland park
32129	air	75	0.173	Fountain	0	TD	65	8160	woodland park
92842	pump	337	0.001	Fountain	0	TD	120	8180	woodland park
150453	pump	250	0.002	Fountain	0	TD	360	8320	woodland park
204107	pump	485	0.001	Fountain	0	TD		8320	woodland park
151945	air	235	0.001	Fountain	2	TD	285	8340	woodland park
268693	air	800	0.000	Fountain	0	TD		8360	woodland park
10920	pump	19	0.263	Fountain	30	TD		8120	woodland park
291899	air	370	0.003	Fountain	0	TD		8200	woodland park
9600	bailer	6	1.000	Fountain	29	TD		8200	woodland park
48822	air	90	0.022	Fountain	10	TD		8360	woodland park
2787	pump	323	0.003	Fountain	70	TD		8260	woodland park
12689	pump	200	0.005	Fountain	5	TD		8400	woodland park
102004	air	30	0.367	Fountain	0	TD	60	8040	woodland park
128451	air	82	0.366	Fountain	45	TD	50	8020	woodland park
196811	air	364	0.003	Fountain	50	TD	35	7960	woodland park
64791	air	165	0.009	Fountain	9	TD	75	8140	woodland park
53306	air	80	0.100	Fountain	35	TD		7960	woodland park
77996	air	209	0.024	Fountain	30	TD	45	7920	woodland park
48729	air	110	0.002	Precambrian	0	235		7940	woodland park
53679	air	260	0.004	Precambrian	20	275		8080	woodland park
42551	pump	8	1.125	Fountain	5	TD	75	8080	woodland park
194091	air	389	0.001	Fountain	0	TD	270	8320	woodland park
267464	air	329	0.009	Precambrian	12	51		8000	woodland park

Permit	well test	drawdown	specific capacity	Formation	FF top	FF bottom	Water Location	elevation	quad
5876	pump	130	0.008	Fountain	70	TD		8120	woodland park
136391	air	350	0.006	Fountain	40	TD	480	8140	woodland park
208351	air	300	0.000	Fountain	0	TD		8120	woodland park
84819	air	83	0.002	Fountain	0	TD	120	8100	woodland park
208450	air	300	0.000	Fountain	0	TD		8100	woodland park
16087	bailer	18	0.111	Fountain	47	TD	78	8080	woodland park
202403	pump	236	0.006	Fountain	12	TD	340	8060	woodland park
73528	air	138	0.004	Fountain	10	TD		8060	woodland park
128000	air	160	0.006	Fountain	50	TD	180	8060	woodland park
271430	air	279	0.001	Fountain	21	TD	110	8020	woodland park
139679	air	43	0.140	Fountain	0	TD	75	8020	woodland park
183765	air	69	0.174	Fountain	0	TD	90	8020	woodland park
87526	air	75	0.013	Fountain	0	TD	123	8000	woodland park
35760	bailer	5	10.000	Fountain	40	TD	40	8040	woodland park
35710	pump	155	0.019	Fountain	44	TD	45	8080	woodland park
15811	pump	50	0.040	Fountain	11	TD		6360	manitou springs
853	pump	47	0.213	Fountain	9	TD		6260	manitou springs
166837	air	#VALUE!	#VALUE!	Fountain	2	TD	70	6300	manitou springs
20244	bailer	132	0.076	Fountain	30	TD	17	6200	manitou springs
29083	air	93	0.011	Fountain	23	TD	23	6280	manitou springs
245371	air	195	0.023	Fountain	0	TD	198	6600	manitou springs
22949	pump	183	0.005	Precambrian	45	100		6660	cheyenne mountain
241094	pump	588	0.002	Fountain	23	TD	135	6530	cheyenne mountain
63987	pump	133	0.113	Fountain	7	TD		6390	cheyenne mountain
273099	air	520	0.010	Fountain	30	TD		6510	cheyenne mountain
20256	air	183	0.027	Fountain	8	TD		6380	cheyenne mountain
246869	NA	#VALUE!	#VALUE!	Fountain	6	TD		6380	cheyenne mountain
63991	bailed	7.5	2.267	Fountain	6	TD		6360	cheyenne mountain
287065	air	680	0.004	Fountain	11	TD		6320	cheyenne mountain
214414	air	81	0.009	Fountain	44	TD	202	6640	cheyenne mountain
22152	bailed	347	0.003	Fountain	4	TD	165	6370	cheyenne mountain
22856	bailed	#VALUE!	#VALUE!	Fountain	2	TD		6460	cheyenne mountain
23926	bailed	64	0.016	Fountain	40	TD	40	6420	cheyenne mountain
122273	air	170	0.006	Fountain	20	TD	120	6470	cheyenne mountain
77053	air	391	0.015	Fountain	18	TD	25	6500	cheyenne mountain

25833	pump	256	0.012	Fountain	20	TD	128	6680	cheyenne mountain
12956	pump	100	0.050	Fountain	5	TD	200	6680	cheyenne mountain
12632	air	125	0.072	Fountain	20	TD		6680	cheyenne mountain
98125	pump	115	0.002	Fountain	4	TD	110	6460	cheyenne mountain
214409	air	249	0.004	Fountain	41	TD	167	6780	cheyenne mountain
207565	pump	208	0.051	Fountain	18	TD	304	6780	cheyenne mountain
214411	air	154	0.390	Fountain	19	344		6660	cheyenne mountain
207566	air	234	0.004	Fountain	36	TD	168	6740	cheyenne mountain
179279	air	50	0.100	Fountain	1	TD		6820	cheyenne mountain
94564	air	189	0.003	Fountain	16	TD	130	6800	cheyenne mountain
156289	air	210	0.005	Fountain	8	TD		6780	cheyenne mountain
180530	air	400	0.005	Fountain	14	TD		6780	cheyenne mountain
43918	air	305	0.016	Fountain	16	TD		6720	cheyenne mountain
186506	air	175	0.034	Fountain	21	525	380	6740	cheyenne mountain
64808	pump	719.4	0.042	Fountain	7	910		6640	cheyenne mountain
192132	air	1020	0.036	Fountain	36	1000		6480	mount pittsburg
189652	air	1070	0.019	Fountain	16	915		6480	mount pittsburg
196571	air	50	0.160	Fountain	12	TD	54	6620	mount pittsburg
196571	air	80	0.188	Fountain	12	TD	168	6600	mount pittsburg
196320	air	387	0.388	Fountain	46	TD	27	6540	mount pittsburg
288195	pump	110	0.136	Fountain	0	TD		6480	mount pittsburg
232049	air	50	0.200	Fountain	10	TD		6460	mount pittsburg
188750	air	500	0.200	Ordovician	5	631	715	6440	mount pittsburg
191525	air	470	0.064	Ordovician	28	310	112	6480	mount pittsburg
204706	air	172	0.349	Fountain	18	TD		6520	mount pittsburg
217976	air	162	0.185	Ordovician	57	335		6760	mount pittsburg
47145	?	12.5	5.096	Fountain	10	565		6560	mount pittsburg
181320	air	159	0.019	Precambrian	5	135	120	6600	mount pittsburg
67871	pump	140	0.679	Fountain	20	530		6520	mount pittsburg
153150	pump	235	0.002	Fountain	4	TD	143	6480	mount pittsburg
164079	pump	205	0.034	Fountain	17.5	592	593	6500	mount pittsburg
137081	air	495	0.006	Precambrian	120	298		6580	mount pittsburg
14470	?	200	0.025	Fountain	10	TD	50	6380	mount pittsburg
708	bailed	100	0.030	Fountain	20	TD		6400	mount pittsburg
295832	air	749	0.005	Precambrian	12	530	630	6420	mount pittsburg
22950	bailed	340	0.003	Fountain	12	314	105	6460	mount pittsburg
180505	pump	470	0.006	Precambrian	0	260		6460	mount pittsburg

300516	air	340	0.029	Precambrian	3	280	618	6460	mount pittsburg
180506	air	484	0.012	Precambrian	135	365	465	6520	mount pittsburg
167966	?	105	0.143	Ordovician	2	85	47	6540	mount pittsburg
172433	air	22	1.364	Fountain	6	45		6560	mount pittsburg
178773	air	138	0.109	Precambrian	10	80	180	6600	mount pittsburg
182410	pump	180	0.008	Precambrian	18	72	205	6620	mount pittsburg
201484	air	165	0.073	Precambrian	26	110		6600	mount pittsburg
184010	air	177	0.085	Fountain	40	TD	85	6640	mount pittsburg
18677	bailed	190	0.016	Fountain	12	TD	60	6420	mount pittsburg
187614	pump	160	0.044	Ordovician	5	322	325	6420	mount pittsburg
186071	pump	800	0.002	Precambrian	7	347	395	6420	mount pittsburg
288313	air	575	0.014	Precambrian	22	310	565	6460	mount pittsburg
239474	air	425	0.035	Precambrian	12	398	684	6480	mount pittsburg
239480	air	650	0.023	Precambrian	1	305	720	6480	mount pittsburg
22635	bailed	115	0.009	Fountain	34	TD	34	6580	mount pittsburg
160929	pump	99	0.071	Fountain	33	260		6600	mount pittsburg
265856	air	327	0.061	Precambrian	0	570	745	6480	mount pittsburg
18462	air	379	0.008	Precambrian	15	390	710	6440	mount pittsburg
18627	bailed	270	0.007	Fountain	40	TD	80	6440	mount pittsburg
66253	bailed	275	0.001	Fountain	8	TD	80	6420	mount pittsburg
18513	bailed	4	5.000	Fountain	27	TD	240	6420	mount pittsburg
9116	pump	1	1.000	Fountain	15	TD		6360	mount pittsburg
46734	bailed	40	0.250	Fountain	10	TD	185	6320	mount pittsburg
177178	air	305	0.003	Fountain	0	TD	322	6020	mount pittsburg
2021	pump	120	0.167	Fountain	40	TD		6020	mount pittsburg

Permit	well test	drawdown	specific capacity	Formation	FF top	FF bottom	Water Location	elevation	quad
21045	bailed	57	0.018	Fountain	15	TD	25	6560	mount pittsburg
27146	air	125	0.048	Fountain	18	154	50	6580	mount pittsburg
144184	air	190	0.105	Fountain	8	TD	329	6580	mount pittsburg
172427	air	#VALUE!	#VALUE!	Fountain	16	TD		6580	mount pittsburg
53897	pump	410	0.012	Precambrian	23	273	96	6600	mount pittsburg
142458	air	225	0.022	Fountain	20	TD	78	6640	mount pittsburg
67531	air	77	0.004	Precambrian	10	80	80	6840	mount pittsburg
77611	air	22	0.014	Fountain	5	TD	95	6840	mount pittsburg
202008	air	230	0.026	Fountain	17	TD		6680	mount pittsburg
203195	air	205	0.044	Fountain	10	TD		6740	mount pittsburg
29563	air	300	0.005	Fountain	0	TD		6760	mount pittsburg
218778	air	260	0.004	Fountain	0	TD		6740	mount pittsburg
254197	air	425	0.002	Fountain	28	TD		6740	mount pittsburg
238851	air	350	0.043	Fountain	15	707		6800	mount pittsburg
198343	pump	225	0.018	Fountain	4	TD	165	6800	mount pittsburg
153621	bailed	102	0.088	Fountain	0	TD	797	6800	mount pittsburg

145513	bailed	58	0.009	Fountain	23	TD		6780	mount pittsburg
204758	air	260	0.004	Fountain	0	TD		6760	mount pittsburg
142148	pump	60	0.050	Fountain	0	TD		6620	mount pittsburg
142162	air	128	0.041	Fountain	10	TD		6620	mount pittsburg
258342	air	132	0.030	Fountain	19	TD		6660	mount pittsburg
152107	pump	130	0.038	Fountain	4	TD		6640	mount pittsburg
142147	air	95	0.037	Fountain	0	TD		6700	mount pittsburg
142457	air	174	0.005	Fountain	72	TD		6560	mount pittsburg
145921	air	273	0.015	Fountain	22	TD	170	6600	mount pittsburg
78919	bailed	116	0.009	Fountain	16	TD		6600	mount pittsburg
277872	air	175	0.034	Fountain	10	TD		6600	mount pittsburg
154577	air	150	0.033	Fountain	10	TD		6640	mount pittsburg
133853	air	140	0.050	Fountain	15	TD	197	6640	mount pittsburg
205491	bailed	155	0.032	Fountain	70	TD		6680	mount pittsburg
143083	air	160	0.019	Fountain	25	TD	250	6680	mount pittsburg
231058	air	700	0.007	Precambrian	2	760	792	6160	phantom canyon
301360	air	320	0.038	Fountain	26	TD	575	6160	phantom canyon
258730	air	125	0.120	Fountain	22	TD	630	6140	phantom canyon
232438	air	55	0.091	Fountain	68	TD	710	6160	phantom canyon
235828	air	50	0.180	Fountain	18	TD	698	6140	phantom canyon
243935	air	755	0.013	Fountain	41	TD	810	6040	phantom canyon
239797	air	670	0.022	Fountain	18	TD	745	6040	phantom canyon
232650	air	650	0.008	Precambrian	31	650	752	6040	phantom canyon
260960	air	658	0.024	Fountain	12	TD	830	6080	phantom canyon
245525	air	575	0.017	Fountain	15	TD	785	6100	phantom canyon
264194	air	220	0.073	Fountain	18	TD	698	6120	phantom canyon
259968	air	375	0.027	Fountain	125	TD	648	6140	phantom canyon
231252	air	200	0.080	Fountain	2	TD	435	6140	phantom canyon
232690	pump	300	0.050	Fountain	1	439	454	6120	phantom canyon
231332	pump	252	0.060	Fountain	2	TD	624	6080	phantom canyon
239464	pump	482	0.021	Fountain	12	TD	580	6060	phantom canyon
235323	air	337	0.001	Fountain	39	TD	480	6040	phantom canyon
231333	pump	285	0.042	Precambrian	2	400	493	6020	phantom canyon
244005	air	1300	0.012	Fountain	78	TD	1560	5920	phantom canyon

244004	air	1280	0.012	Fountain	98	TD	1270	5920	phantom canyon
145515	bailed	70	0.071	Fountain	20	TD	40	5860	phantom canyon
198711	air	700	0.004	Fountain	4	TD	960	5860	phantom canyon
177055	air	80	0.006	Fountain	220	TD	225	5800	phantom canyon
144837	air	67	0.119	Fountain	140	TD	100	5840	phantom canyon
139419	air	180	0.003	Fountain	18	TD	180	5820	phantom canyon
198133	pump	250	0.040	Fountain	2	TD	1050	5800	phantom canyon
238690	pump	240	0.013	Fountain	39	TD	290	5800	phantom canyon
265610	air	100	0.150	Fountain	2	TD	335	5800	phantom canyon
111242	air	100	0.005	Fountain	38	TD	125	5800	phantom canyon
203732	air	75	0.200	Fountain	4	TD	258	5820	phantom canyon
138805	air	75	0.200	Fountain	2	TD	355	5780	phantom canyon
269635	air	125	0.120	Fountain	6	TD	256	5720	phantom canyon
116732	air	65	0.015	Fountain	23	TD	15	5680	phantom canyon
187494	air	131	0.031	Fountain	30	TD	30	5680	phantom canyon
50737	?	221	0.226	Fountain	0	TD		5960	cooper mountain
15028	?	814	0.369	Fountain	0	TD		5940	cooper mountain
277392	air	425	0.035	Fountain	28	TD	590	5940	cooper mountain
225839	air	40	0.025	Fountain	35	TD	65	6000	cooper mountain
95524	?	40	0.250	Fountain	~30	TD		6020	cooper mountain
240932	dry	#VALUE!	#VALUE!	Fountain	0	TD		6160	cooper mountain
300770	air	500	0.020	Fountain	68	TD	495	6100	cooper mountain
259142	air	590	0.025	Fountain	2	TD	575	6080	cooper mountain
268111	air	690	0.022	Fountain	4	TD	675	6100	cooper mountain
153560	dry	#VALUE!	#VALUE!	Fountain	3	TD		6000	cooper mountain
229583	air	920	0.016	Fountain	31	TD	878	6120	cooper mountain
258805	pump	539	0.006	Fountain	0	TD	905	6180	cooper mountain
238655	air	880	0.017	Fountain	51	TD	845	6200	cooper mountain
222927	pump	640	0.016	Fountain	20	995	1080	6280	cooper mountain

261299	dry	#VALUE!	#VALUE!	Fountain	15	TD		6280	cooper mountain
226384	air	810	0.019	Fountain	33	TD	985	6380	cooper mountain
226383	pump	8	0.375	Fountain	14	TD	114	6480	cooper mountain
231019	air	150	0.027	Fountain	6	TD	160	6520	cooper mountain
231019	pump	530	0.014	Fountain	18	TD	1305	6600	cooper mountain
252505	air	325	0.004	Fountain	35	TD	160	6600	cooper mountain
270119	pump	185	0.065	Fountain	47	TD	198	6600	cooper mountain
231021	air	89	0.034	Fountain	0	TD	160	6600	cooper mountain
131590	air	67	0.030	Fountain	10	TD	155	6180	cooper mountain
134320	air	363	0.008	Fountain	0	TD	520	6160	cooper mountain
245218	air	#VALUE!	#VALUE!	Fountain	26	TD		6160	cooper mountain
52066	?	69	0.652	Fountain	~20	TD		6120	cooper mountain
259302	air	665	0.023	Fountain	45	TD	648	6120	cooper mountain
95528	air	70	0.214	Fountain	58	TD	54	6140	cooper mountain
241587	air	61	0.164	Fountain	30	TD	80	6160	cooper mountain
262959	pump	290	0.031	Fountain	2	TD	568	6200	cooper mountain
241747	air	85	0.059	Fountain	0	TD	415	6200	cooper mountain
250653	air	150	0.100	Fountain	50	TD	308	6220	cooper mountain
225835	air	133	0.075	Fountain	37	TD	330	6240	cooper mountain
20911	pump	65	0.077	Fountain	16	TD	94	6260	cooper mountain
241581	pump	65	0.231	Fountain	37	TD	155	6240	cooper mountain
241600	air	60	0.033	Fountain	4	TD	40	6280	cooper mountain
262175	air	185	0.005	Fountain	21	TD	293	6320	cooper mountain
282215	air	300	0.050	Fountain	2	TD		6360	cooper mountain
231337	air	170	0.006	Fountain	25	TD	287	6320	cooper mountain
231337	air	500	0.030	Fountain	28	TD	671	6340	cooper mountain
239987	air	135	0.015	Fountain	16	TD	237	6420	cooper mountain
52067	bailed	204	0.015	Fountain	28	TD		6400	cooper mountain
238676	air	120	0.029	Fountain	39	TD	240	6440	cooper mountain

239988	air	167	0.018	Fountain	39	TD	320	6440	cooper mountain
8724	?	55	0.273	Fountain	45	TD		6180	cover mountain
222364	air	855	0.012	Fountain	64	TD	985	5780	royal gorge
211089	air	80	0.006	Fountain	15	TD	15	5800	royal gorge
224420	air	25	0.080	Fountain	30	TD		5840	royal gorge
224421	air	150	0.003	Fountain	20	TD		5880	royal gorge
273123	air	195	0.026	Fountain	2	TD	190	5860	royal gorge
282985	air	80	0.125	Fountain	4	TD	280	5900	royal gorge
235855	pump	59	0.203	Fountain	6	TD	60	5920	royal gorge
220217	air	5	3.000	Fountain	4	TD	130	5920	royal gorge
222706	pump	150	0.100	Fountain	20	TD	193	5980	royal gorge
150799	air	52	0.481	Fountain	13	TD	185	5980	royal gorge
150798	air	7	1.429	Fountain	31	TD	125	6100	royal gorge
42793	pump	44	0.023	Fountain	23	TD	37	5980	royal gorge
211158	air	243	0.004	Fountain	19	TD	280	5820	royal gorge
111851	air	93	0.151	Fountain	4	TD	290	5760	royal gorge
81774	air	30	0.367	Fountain	6	TD	376	5700	royal gorge
44813	?	107	0.009	Fountain	0	TD	25	5660	royal gorge
48452	air	14	1.071	Fountain	17	TD	17	5440	royal gorge
226381	air	900	0.017	Fountain	2	TD	945	5560	royal gorge
258033	air	115	0.087	Fountain	11	TD	45	5900	canon city
122433	air	93	0.011	Fountain	25	TD	125	5800	canon city

Permit	well test	drawdown	specific capacity	Formation	FF top	FF bottom	Water Location	elevation	quad
275466	air	599	0.017	Fountain	1	TD	535	6400	wetmore
167720	air	600	0.042	Fountain	45	TD	574	6420	wetmore
135749	air	21	0.571	Fountain	6	TD	65	7660	wetmore
219296	pump	418	0.033	Fountain	1	TD		7220	wetmore
22745	?	#VALUE!	#VALUE!	Fountain	~5	TD		6440	wetmore
277944	pump	29	0.152	Fountain	14	TD	152	6900	wetmore
68678	air	567	0.668	Fountain	7	TD		6660	wetmore
91652	air	#VALUE!	#VALUE!	Fountain	2	TD	55	6680	wetmore
56511	bailed	10	1.500	Fountain	3	TD	10	6580	wetmore
210543	pump	365	0.027	Fountain	35	TD		6590	wetmore
278028	air	92	0.033	Fountain	23	TD	23	6660	wetmore
54586	bailed	32	0.469	Fountain	0	TD	8	6580	wetmore
114770	air	196	0.041	Fountain	9	TD	420	6720	wetmore
32729	bailed	48	0.104	Fountain	13	TD		6840	wetmore
187002	pump	25	0.320	Fountain	2	TD	158	6820	wetmore
32727	pump	70	0.037	Fountain	11	TD	190	6960	wetmore
32729	air	170	0.051	Fountain	22	TD		6920	wetmore
210435	air	51	0.392	Fountain	20	TD		6960	wetmore
20338	bailed	34	0.029	Fountain	28	TD	57	7260	wetmore

121053	air	26	0.385	Fountain	4	TD	48	7120	wetmore
161390	pump	155	0.003	Fountain	25	TD	23	7200	wetmore
119228	air	699	0.021	Fountain	24	TD	665	6500	beulah
153319	pump	113	0.133	Fountain	50	TD	50	6400	beulah
176236	air	246	0.041	Fountain	20	TD		6360	beulah
206086	air	227	0.040	Fountain	5	TD	215	6380	beulah
206085	air	57	0.158	Fountain	7	TD	67	6320	beulah
75399	air	90	0.078	Fountain	15	TD	115	6340	beulah
294226	pump	210	0.030	Fountain	36	TD	234	6280	beulah
190115	bailed	24	0.833	Fountain	8	TD	17	6260	beulah
6685	air	145	0.103	Fountain	6	TD	135	6250	beulah
111164	air	#VALUE!	#VALUE!	Fountain	90	TD		6280	beulah
242931	air	975	0.015	Fountain	6	TD	1048	6410	beulah
22	?	#VALUE!	#VALUE!	Fountain	35	TD		6340	beulah
49334	pump	34	0.353	Fountain	3	TD	80	6500	beulah
270278	pump	310	0.006	Fountain	3	TD	443	6740	beulah
279035	air	250	0.040	Fountain	22	TD	428	6680	beulah
270275	air	65	0.231	Fountain	3	TD	240	6640	beulah
276061	pump	45	0.333	Fountain	2	TD	284	6660	beulah
8005	pump	20	0.300	Fountain	27	TD		6430	beulah
23788	pump	9	1.667	Fountain	3	TD		6360	beulah
232054	air	105	0.143	Fountain	30	TD	102	6390	beulah
155012	air	67	0.224	Fountain	23	TD	110	6250	beulah
6811	pump	55	0.218	Fountain	15	TD		6190	beulah
11391	pump	30	1.000	Fountain	15	TD	250	6290	beulah
149965	bailed	41	0.171	Fountain	15	TD	15	6220	beulah
222288	?	#VALUE!	#VALUE!	Fountain	36	TD		6360	beulah
81631	pump	23	0.435	Fountain	21	TD	13	6580	beulah
77298	air	57	0.044	Fountain	15	TD	28	6500	beulah
79672	air	75	0.010	Fountain	25	TD	75	6540	beulah
50187	pump	25	0.200	Fountain	17	TD	21	6560	beulah
78015	bailed	160	0.009	Fountain	4	TD		6650	beulah
79890	air	185	0.005	Fountain	3	TD	229	6700	beulah
66954	?	#VALUE!	#VALUE!	Fountain	10	TD		6620	beulah
2365	bailed	#VALUE!	#VALUE!	Fountain	~10	TD		6820	beulah
95336	pump	50	0.160	Fountain	45	TD	50	6860	beulah
276063	pump	105	0.114	Fountain	2	TD	435	6640	beulah